JULY 22, 1943

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The IRON AGE

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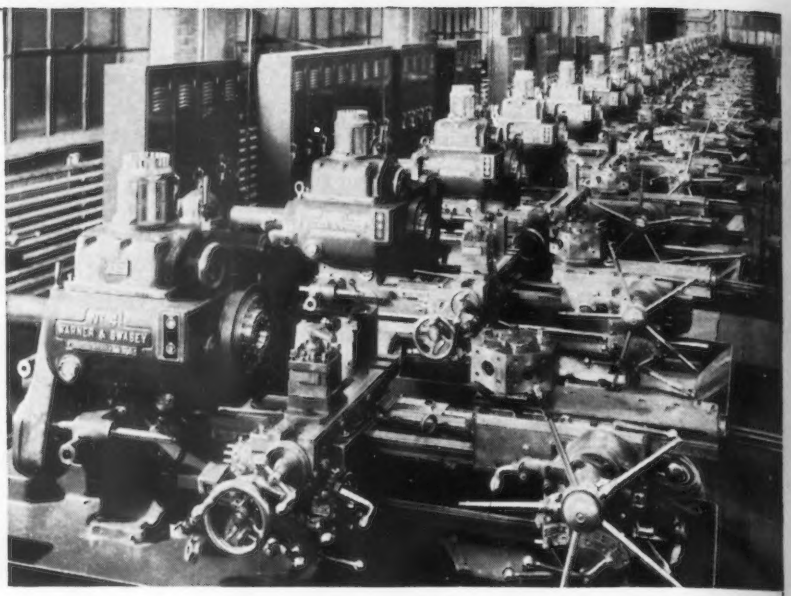

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This Week in The IRON AGE

Vol. 152, No. 4 July 22, 1943

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Technical Articles

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Features

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News and Markets

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Another Industry Switches to

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Dollar in Bank Versus Dollar in Sock

WHAT we call hoarding, or the accumulation of excessive inventories, is not always a matter of intent. In some cases it is almost a matter of compulsion. The distribution pattern has a good deal to do with it.

If we did not have banks to take in and hand out dollars, but each person was his own depository, there would have to be thousands of times more total currency printed in order to take care of business and personal requirements. And this would be true even if dollars, like steel, made only one trip to market instead of many.

The same thing is true with regard to foodstuffs, which, like steel or other industrial materials, also make but one trip to market. If we all lived miles away from the grocery store instead of next door to one we would have to buy our Wheaties by the case instead of the package. And this too would encourage excessive inventories awaiting use.

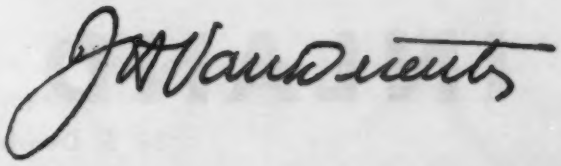
In the very vitally necessary endeavor to squeeze two more million tons of steel this year into our increasing war effort, the WPB is putting great stress upon the reduction, wherever possible, of inventories. A large part of the total additional steel going into supply is expected from this source. One ton of steel put to use from existing inventory is certainly worth two tons from future production from the standpoint of war effect.

In this connection it might be well to consider the part that the steel warehouse plays in distribution. In the early months of the war, several million tons of steel were taken from warehouse stocks to meet war emergencies. As a result of the ensuing shortage of steel in warehouses many consumers felt it necessary to build up their own stocks. Since one ton of steel in warehouse will probably do, in a given time, the equivalent amount of work of five or ten tons scattered in individual plants, the total effect on inventory was no doubt considerable.

In addition, CMP regulations giving steel producers the authority to reject orders for less than minimum quantities has undoubtedly tempted many consumers to place orders at the mills for two or three tons in order to obtain half a ton of needed material.

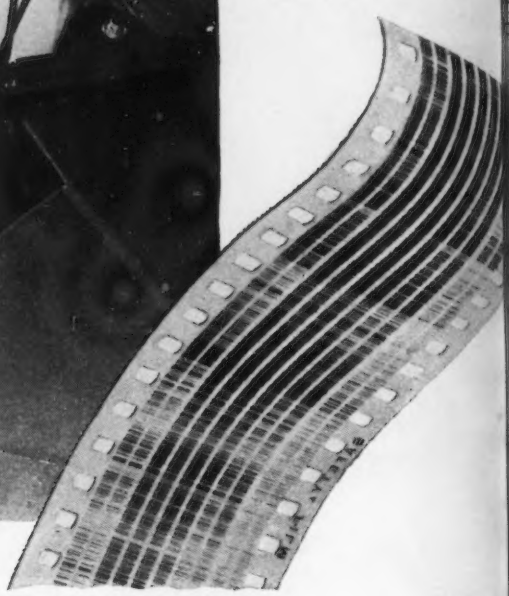
Since the first of the year there has been a marked improvement in mill deliveries to warehouses. Generally speaking the supply now enables warehouses to take care of what under normal circumstances might be considered a fairly high percentage of customer requirements.

The drive on inventory reduction will center upon the 2000 of our largest steel consumers who, as a rule, buy direct from mills. However among the remaining tens of thousands of smaller consumers there is probably a higher percentage of "overage" even though the total in tons may not aggregate as much. The specialized economic position of the warehouse should enable us to reach effectively into these thousands of smaller inventories, providing we permit warehouse service to function on its most efficient basis.



Examination of the spectrum emanating from the vaporization of the steel sample in an electric arc quickly reveals the chemical content of the sample.

A spectrographic film provides a permanent record of each sample.



How the Spectrograph Helps Maintain Inland Quality

Every open hearth heat run at the Inland mills is checked not only by routine control methods of chemical analysis, but also in a special spectrographic laboratory.

Inland was one of the first steel mills in America to install and develop technique for using the spectrograph in control of quality. An important advantage of this method is the rapidity with which tests can be made. At any stage during the working of a heat a melter can have an accurate check on the chemical content within ten minutes after a sample is delivered to the laboratory. Not only do these frequent and rapid tests assure the uniform high quality of Inland steel, but they also help maintain capacity production—a vital necessity in this time of war.

The spectrographic analysis is only one of the many checks and balances used by Inland in the production of steel—it is only one of the numerous quality control methods adopted by Inland after rigid tests prove their practicability.

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The IRON AGE
JULY 22, 1943

NEWS FRONT

• Drastic switch of can manufacture from tin plate to lacquered stock likely will appear at war's end as the result of American Can's acquisition of the Diller machine for flash (butt) welding of can bodies at speeds exceeding those for conventional seaming and soldering. Diller, a young free lance engineer, turned down a $500,000 stretched out payment in favor of a much smaller spot settlement. He also has worked out a promising new welding scheme for airplane propellers, for which Curtiss-Wright is negotiating.

• It probably won't be long until an Anglo-American agreement on common uniform sheet metal and wire gages substitutes direct measures in decimals of an inch for the numbered gage sizes now used in each country.

• Radar production has been hard pushed to meet demands because of shortage of diamond dies for drawing 0.00035-in. nickel chrome, copper and aluminum wire. A 12-spindle, high speed vertical machine for diamond drilling, developed by Harris-Robbins, patents for which were bought up by the government, is being leased by WPB's diamond die unit to 7 die makers, with deliveries soon to be made.

• Fad thinkers held forth last year on how nobly the home front could take sacrifice and inconvenience if only a hesitant Government would make the demand. Now the view is that sacrifice is unnecessary. The next stage will be that sacrifice is positively wrong, likely to end in fostering European communism and feeding of Hottentots.

• Government salvage officials pooh pooh the necessity of drives for cat-and-dog copper scrap (roofs, doorknobs, etc.). Not only is there a current glut of several million pounds of brass rod turnings, but the Army and Navy have in storage tens of millions of pounds of fabricated brass, moving slowly or not at all.

• Hopes of a spectacular ore pocket on a Lake Superior area property not now being worked were raised high after a single test hole drilling a few weeks ago by Cleveland Cliffs Iron Co. Further drillings are being made.

• The detinning plant construction program is definitely out, with contracts for all but one plant cancelled. Reasons are: (1) No trouble now in getting tin from the Belgian Congo; (2) not enough tin can be recovered from electrolytic tin plate to warrant continuance of the program.

• WPB's can making order will be modified soon to force use of more electrolytic tin plate for certain can ends. Such use now is optional.

• Lend-Lease has just placed an order with National Tube for more than 3600 tons of 4-6 chromium tubing for shipment to Russia during the rest of this year. The tubing, for oil refining, represents the largest order of this type ever placed.

• According to one of the largest planer manufacturers, by the end of 1943 there will be enough planers to last industry in this country until 1955.

• A new type of thermo-hardening resin plastic laminated with a high strength woven glass fiber is showing considerable promise for a number of airplane structural applications.

• Those companies putting in electric furnace capacity since 1941, which never before had such capacity, have been Andrews Steel Corp., Youngstown Sheet & Tube, Byers, Isaacson, and Babcock & Wilcox. Bethlehem, Universal-Cyclops, and Ford have made no electric furnace additions during the same period.

• New German fighter planes are loaded with armor plate, vindicating British insistence on such pilot protection several years ago. The Me 210 fighter-bomber carries some 900 lb. around engine, pilot and liquid-cooling system, the armor accounting for about 10 per cent of total weight.

• OPA has set a ceiling price on charcoal made from hard wood at $33 in New York and Pennsylvania area; $27 in Tennessee and Arkansas. These ceiling prices are higher than those for charcoal iron. Charcoal currently imported from Cuba runs about $90 a ton.

• The British Typhoon and the American Thunderbolt have been distinctively colored so that ground crews will not confuse them with German Fw's. Germany probably will copy this coloring, as in the past a deliberate effort has been made to imitate Allied markings: for instance, rings around the black crosses, white vertical stripes on tail fins, a yellow stripe along the leading edge of certain fighters, etc.

Microradiography of Light Alloy

MODERN methods of manufacture and research, especially in the fields of light alloys have advanced so rapidly under the impetus of war necessity that it is not surprising there is some confusion regarding the application and correct techniques of the various X-ray methods of examination now available to assure soundness and safety.

Clearly to be distinguished in technique, application and interpretation are ordinary or *macro*radiography and the new method of *micro*radiography. The former involves comparatively massive specimens and photographic registration of a "shadowgraph" which has the same size as the irradiated portion of the specimen (enlargement ratio 1:1). The radiograph delineates gross structure—defects, discontinuities, etc.—with negligible absorption for X-rays in comparison with the solid matrix. In such a case there is no possibility of distinguishing the microstructure such as grain boundaries and phase precipitation in a sound portion of the matrix which appears, therefore, as a homogenous single phase regardless of the wavelength of the X-ray beam. Thus the use of X-ray tubes with different targets, and the distinction between general or "white radiation" and characteristic K-series rays becomes of minor significance so long as the penetrating power of the X-ray beam, as controlled by voltage, is compatible with the effective atomic numbers of the chemical elements in the specimen and with thickness. Both these factors are involved in the fundamental absorption law:

$$I = Ie^{-\mu x}$$

Where I_o = Initial intensity of the X-ray beam

I = Intensity after passing through thickness x

μ = Absorption coefficient, which depends upon the wavelength and also on the atomic number of the chemical element

e = 2.7128, the base of the natural system of logarithms.

An unfiltered X-ray beam, containing general radiation only, or characteristic radiation of the particular target metal superposed on the general radiation, has an "effective" wavelength, which means that it is absorbed in the same way as some particular ray which is strictly monochromatic. Thus it is not surprising that the radiation from a tungsten target tube, commonly used for steel and heavy metals, should also be applicable to light alloys as shown by Woods and Cetrone,[1] who experimentally demonstrated that optimum voltage is more important than target metal in the production of good radiographs.

On the other hand, microradiography presents an entirely different problem. The specimens are only a few thousandths of an inch thick; the radiograph is photographically enlarged up to 300 diameters, and it

FIG. 1—Tracing of a radiation analysis of unfiltered radiation from a machlett molybdenum target X-ray tube, at 40,000 volts and 15 milliamp.

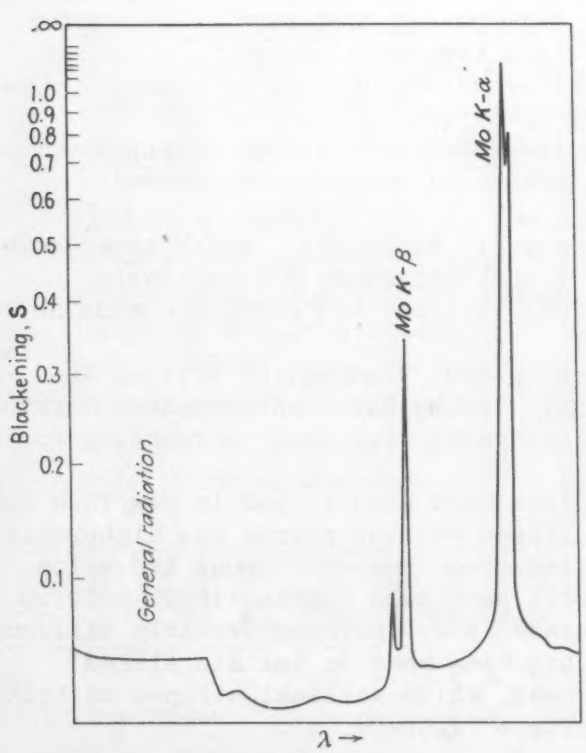
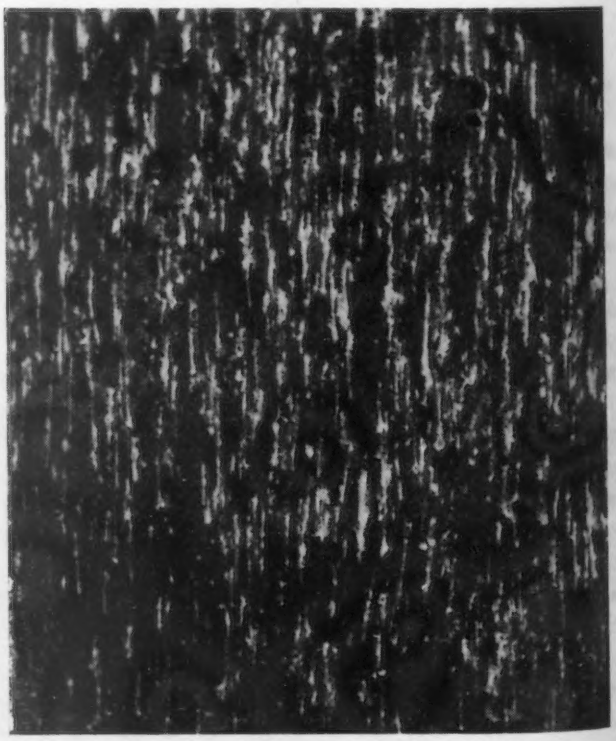


FIG. 2—Section of swaged duralumin propeller. (Negative print, 100x). Microradiograph made by copper characteristic radiation. Light regions are $CuAl_2$.



Spot Welds

By S. T. GROSS and G. L. CLARK
Noyes Chemical Laboratory,
University of Illinois,
Urbana, Ill.

. . . In this new technique of microradiography, a radiograph of a tiny section is photographically enlarged several hundred times so as to delineate microstructure. Wherein conventional radiography, the wavelength of the X-rays are of little importance, the distinction between rays from different types of targets must be made when studies of grain boundaries and phases precipitation are being made with microradiography. In this report, the authors use as their chief example the analysis of a sectioned aluminum spot weld. The method may be coordinated with diffraction analysis to identify phases and confirm such analysis as may be made from microradiographs.

delineates *microstructure*. To be successful, it must be possible to distinguish, for example, between magnesium (atomic number 12), aluminum (13) and silicon (14) if they appear in separate phases in the alloy even in extremely dispersed form. They have closely similar absorption coefficients for X-rays. Thus successful technique depends upon the careful selection and regulation of X-ray wavelength.

Sample Must Be Thin

Briefly, the technique consists in passing an X-ray beam of carefully selected wavelength, preferably monochromatic or with one wavelength greatly predominating, through a thin section of the alloy, which need not be highly polished. Since there are no lenses for enlarging an X-ray image directly, the small radiograph of the exact size of the beam is registered on special photographic film with a very fine-grained or Lipmann emulsion, which is commercially available. This "spot" in which the finest detail is recorded is then photographically enlarged up to 300 diameters without loss of essential detail from graininess.

The present authors have published since 1939 several contributions[2, 3, 4, 5] in the field of the microradiography, which deal exhaustively with the theory, the methods of making such radiographs and also with the possible interpretation. It is true, however, that there may be a tendency to think of microradiography as a routine control method—rather than as a method of improving or devising production methods. For light alloys of the aluminum and magnesium types, microradiography requires specimens about 0.010 in. or less in thickness. This obviously makes the method unsuitable for routine control except in exceptional cases where thin sheets of material are being prepared. On the other hand, it may be used much as is

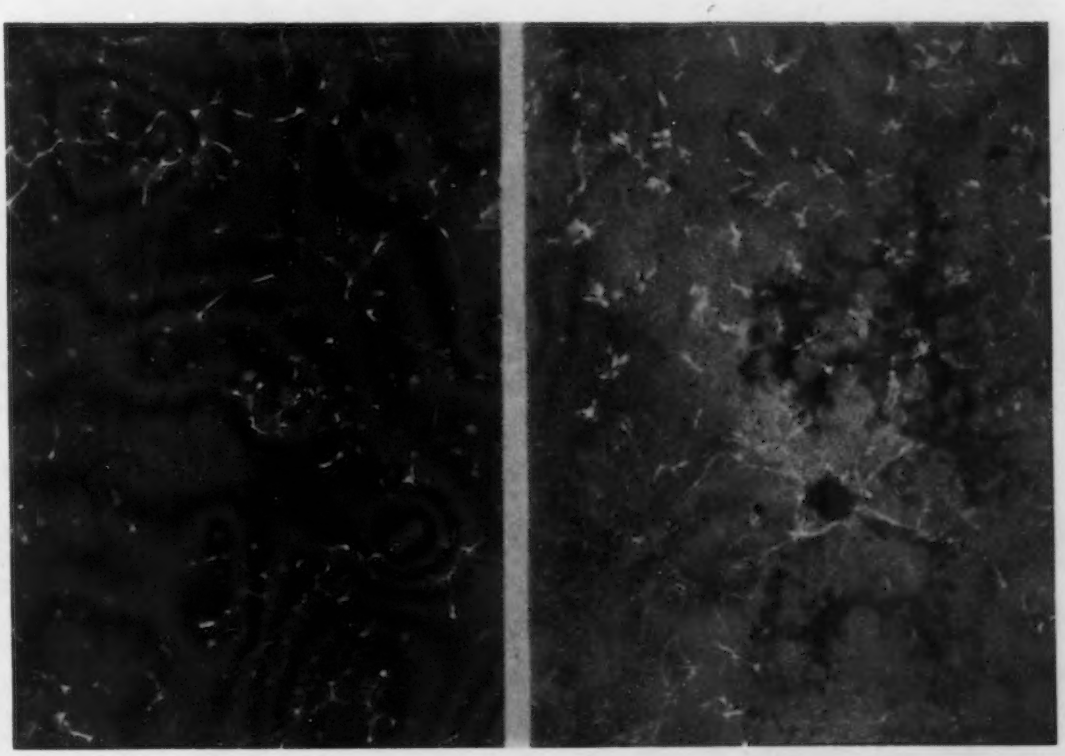


FIG. 3 — Microradiograph of (a) duralumin and (b) duralumin containing Mg. (Negative prints, 100x) Copper radiation. Left print exhibits cavities containing in many cases inclusions of segregated $CuAl_2$. Alloy at right contains considerable magnesium. Compare with Fig. 4 for the characteristic nature of the dark regions, indicating low absorption.

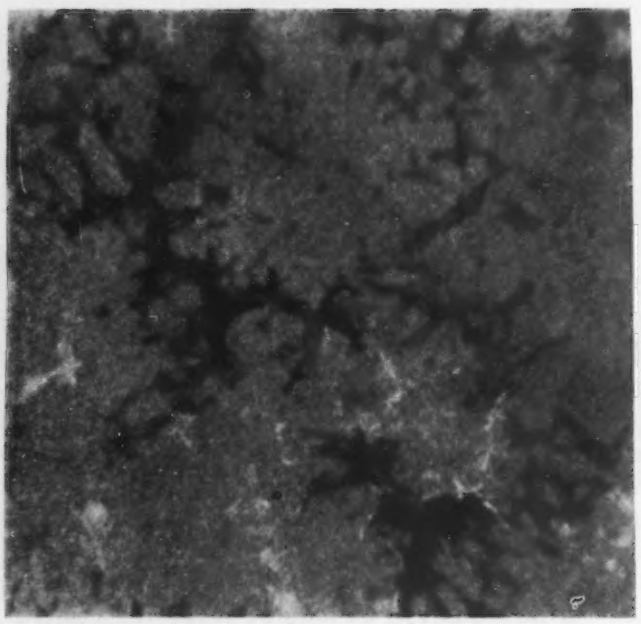


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FIG. 4—Microradiographic negative print of Mg-Al alloy (12 per cent Mg.). Copper characteristic radiation. (200x). Compare with Fig. 3(b).

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microscopic metallography, and yet since the microradiograph applies to a 3-dimensional specimen while the photomicrograph of a polished and etched surface is essentially 2-dimensional, it will be found to give additional information which can be of considerable value. Effects of heat treatment, ageing, cold working, etc., all may be expected to show certain phenomena in the microradiograph.

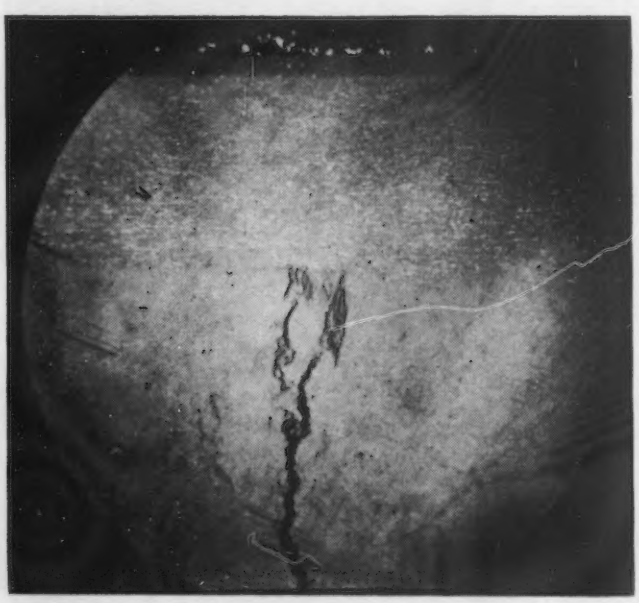
Excepting the time used to prepare the specimens, and with light alloys such as indicated above, the microradiographic exposure will rarely take more than 3 or 4 min. at most. Some magnesium alloys can be examined with an exposure of 15 sec. It is evident that the time factor is not too important. Even a stainless steel specimen (0.002 in.) can be satisfactorily examined in 10 min. with a Machlett cobalt-target X-ray diffraction tube.

Fine Grain Film Necessary

As already mentioned, an extremely fine grain film is necessary for radiographs of this type. Gaevert Lipmann emulsion has been used in this laboratory for a considerable period of time. Eastman 548-0 plates have been found satisfactory and recently excellent results have been obtained with Eastman 548-0 film. All of the illustrations in this paper have been made with Eastman film, using copper radiation (unfiltered) from a Phillips Metallix diffraction tube, with exposures of the order of 4 min. The exact technique of making patterns has been previously described as has also the theory dealing with the contrast to be obtained and the necessary exposure.[4, 5]

One of the most interesting and valuable extensions of microradiography, also described in detail by the present authors in previous publications,[4, 5] is the multiple radiation technique. X-ray tubes with different targets such as chromium, iron, cobalt, copper, molybdenum, etc., may be operated so that one wave length, that of the Kα ray, of each element, predominates. Thus each tube produces its own characteristic radiation and wavelengths may be selected at will by the choice of target. A specimen for microradiographic examination may have several constituents, each with a different absorbing power. Depending on the absorption coefficients, two or more of these may be differentiated by rays from one target, and two or three others in identically the same spot may be differentiated by rays from another target.

For example, a sample of bronze is first investigated with characteristic molybdenum radiation (0.7078 Angstrom units). On the negative print lead only appears as white areas. With copper target, lead and tin both appear on the negative print. Thus any chosen area of the two photographs may be compared to show the distribution of tin in the general structure. In the molybdenum target microradiograph slight evidence of the tin areas appears in gray, from which it may be concluded that there is some solid solution of tin in lead or that an intermetallic compound is formed. Thus by this differential method any

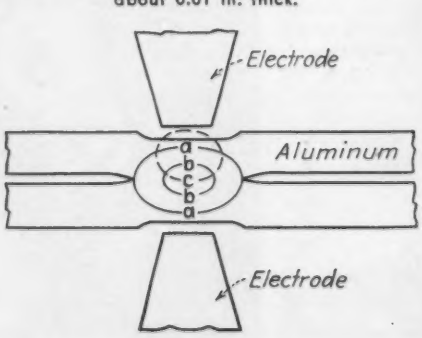


LEFT

FIG. 5(a)—Microradiograph of cross-section of an aluminum alloy spot weld using copper K-alpha characteristic radiation. (Negative print, 28x). Dark regions correspond to low absorption of the X-ray beam.

BELOW

FIG. 5(b)—Specimen from aluminum alloy spot weld, as cut out for microradiographs [Figs. 5(a) and 6] and diffraction patterns (Fig. 7). The dash circle shows the X-rayed area that was "blown up" in the microradiograph. Section was sliced about 0.01 in. thick.



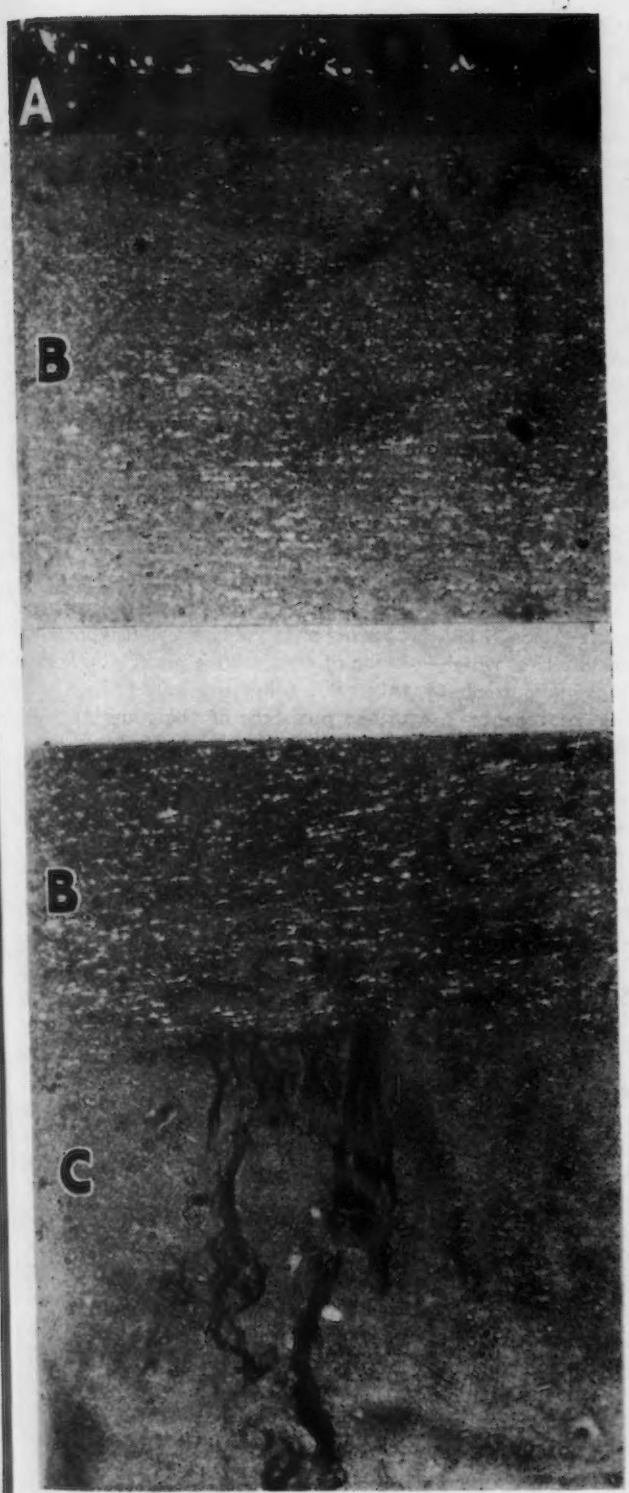


FIG. 6—Negative microradiographs showing the spot weld structure at 100x. Copper radiation. Compare with diffraction patterns in Fig. 7.

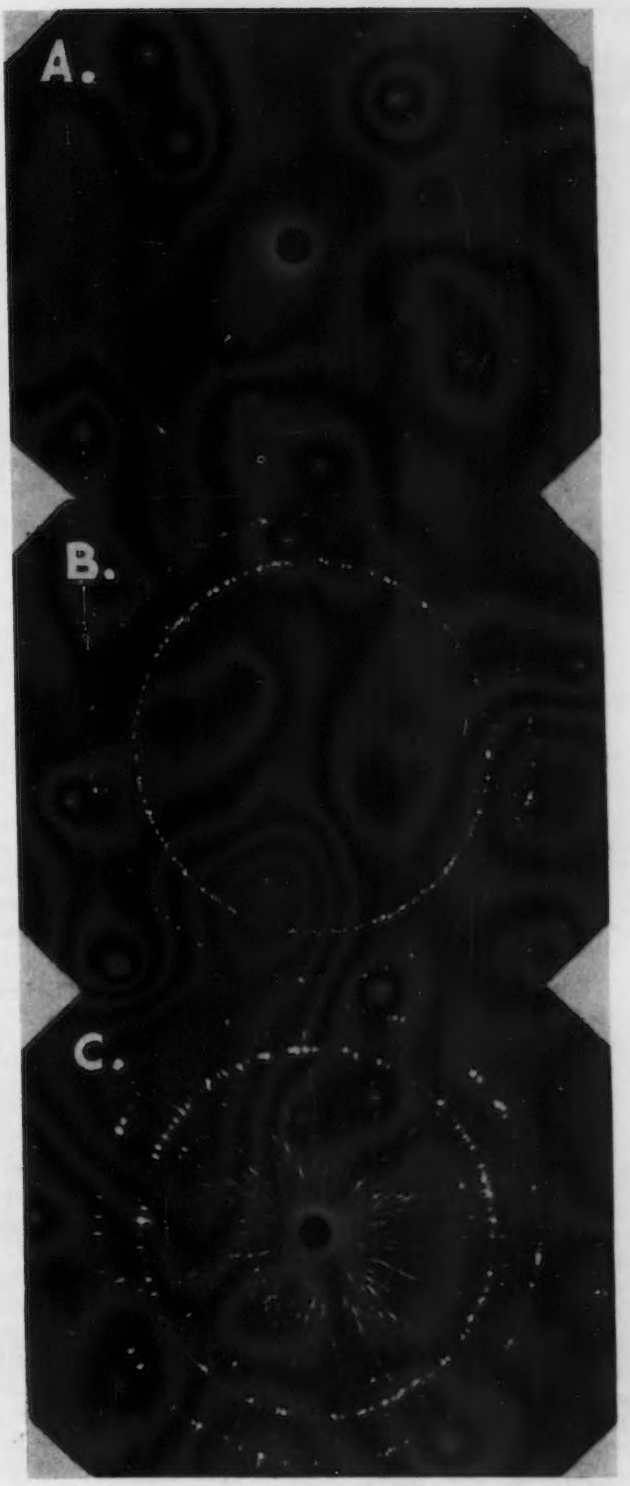


FIG. 7—Diffraction patterns of the three layers in an aluminum spot weld; filtered copper radiation, 3cm.

complex alloy may be successfully analyzed, the selection of the proper radiation depending on the differences in tabulated linear absorption coefficients.

Characteristic Radiations

If an oscillating crystal spectrum is photographically recorded from a molybdenum target X-ray diffraction tube, for example, we obtain such a graph from a microphotometer as is shown in Fig. 1. The graph goes almost to the short wavelength limit, but this is obscured due to halation from the undiffracted X-ray beam. This method of radiation analysis tends to enhance the part of the radiation which is here indicated as general radiation in respect to the characteristic radiation which essentially controls the microradiographic exposures. In spite of this enhancement it will be noted that the intensity of the almost pure characteristic K-alpha radiation practically completely drowns out these background effects. This would not be true if a heavy filter

were placed before the window of the diffraction tube, and used to filter out the softer radiation provided the voltage is considerably above that required to just excite the characteristic rays.

Thus a very thick sample will not make effective use of such characteristic radiations at all, and any effects observed would be due to the harder or more penetrating general radiation. This is in accord with the generally understood principle that the higher percentage of an inhomogenous X-ray beam absorbed, the harder the transmitted radiation. This may well be the case in *macro*radiography, and may be a problem in this field.

Another way of illustrating the manner in which the characteristic radiation completely drowns out the general radiation is by examination of an ordinary diffraction pattern of an aggregate of small crystal grains, as indicated in Fig. 7. Here the radiation responsible for each intense line is K-alpha. There is no evidence of any effect due to general radiation present in the beam which is not negligible in comparison with the sharp characteristic lines. Simple filtration with characteristic filters will even remove some of the lines and leave only the most intense K-alpha doublet.

While not the subject of this paper, the X-ray diffraction technique is mentioned because it supplements so well many of the microradiographic studies. This depends upon the fact that a crystal, by virtue of the perfectly arranged atoms on equidistant parallel planes, acts as a diffraction grating for X-rays which impinge as a narrow pencil of rays defined by pinholes on the crystals. Thus a pattern is photographed which is characteristic of the ultimate crystalline structure of the given material and thereby identifies the specimen. Each separate crystalline constituent produces its own pattern of spots or lines. The pattern also distinguishes the texture of the specimen—that is, whether it is a single crystal or an aggregate (or powder) as in Fig. 6, or whether there is preferred orientation of grains from cold working.

The importance of the characteristic radiation lies in the fact that a wide range of specific wavelengths can be selected and may be generated by using diffraction tubes with different target metals; and that their quality (softness) or wavelength is not altered with change in voltage on the diffraction tube. Thus copper characteristic radiation corresponding to a voltage of about 8970 (8.97 kv.) will retain all properties of the radiation generated at the minimum critical voltage even though 50,000 volts are placed across the X-ray tube, the only change being that as the voltage is increased the intensity of the copper radiation will increase almost as the square of the voltage difference (voltage on tube less characteristic voltage).

The use of selected characteristic K-alpha radiation in the preparation of successful microradiographs with excellent contrast is illustrated with a number of examples.

Fig. 2 illustrates a section of a swaged duralumin airplane propeller, showing the orientation of the $CuAl_2$ segregations—the high concentration of the copper in this crystalline segregation accounts for the relatively high absorption observed. Fig. 3(a) is the microradiograph of some Alcoa S 295 alloy showing curious cavities which $CuAl_2$ crystal inclusions have tended to fill up. Fig. 3(b) represents a microradiograph of S 220 alloy, containing a considerable amount of magnesium. The dark shadows are apparently characteristic of such alloys as may be noted by comparison with Fig. 4 made from a specimen containing 12 per cent magnesium and the remainder aluminum.

Application to Spot Welds

Spot welds of light alloys are of considerable interest and importance at the present time. Microradiographs present remarkable details of the structure (in the micro sense) far beyond the scope of the best spot-weld radiographs which can depict only the gross or macro features of the junction. For example, Fig. 5(a) shows a microradiograph at 28 diameters taken through half a section of an aluminum spot weld. As sketched in Fig. 5(b), a vertical section about 0.01 in. thick was cut through the spot weld nugget. Surprisingly enough it will be noted that there are at least three distinct types of layers present in a single sheet. Fig. 6 at 100 diameters emphasizes the differences in structure.

Surface *A* must be very high in aluminum since its absorption is remarkably low. Layer *B* contains a large amount of segregated $CuAl_2$ with the crystals all oriented at right angles to the direction of the weld. The central layer *C* which is found in both sheets shows cracks and channels in a matrix which is lacking in segregated $CuAl_2$. The separation of the two inner layers *B* and *C* is extremely sharp, and it may be noticed that the cracks from the central portion of the weld tend to turn and follow this boundary. This, as well as the absence of $CuAl_2$ in the one layer, indicate clearly that there is a considerable tension or strain at the boundary of these two layers. The $CuAl_2$ layer is probably quite soft, while the central layer must contain considerable copper in solid solution and may be expected to be hard.

This analysis is largely confirmed by means of diffraction patterns shown in Fig. 7. *A*, *B*, and *C* refers to the layers shown in Fig. 6. The diffraction effects of the aluminum are shown, since the pattern due to the $CuAl_2$ is very faint and exposures were not sufficiently long to emphasize this portion of the pattern. Layer *A* corresponds to pure aluminum, and shows essentially smooth rings, corresponding to work hardening, at least approximately. Layer *B* shows absence of strain with many single crystals each reflecting to produce spots in the positions of the aluminum diffraction whereas layer *C* shows distortion and reflection of spots at angles other than the diffraction angle (strain).

Limitations of Technique

It should be noted that light alloys are not the only material suitable for this type of investigation. Steels, bone structures, even biological tissue materials may be examined in this manner. The greatest utility, however, unquestionably lies in the various branches of metallurgy. The greatest handicap of the method is fixed by the grain size of the emulsion used—at present only about 300 diameters can be obtained. The advantages are that no etching, fine polishing, etc., are needed, and that the picture obtained is three-dimensional, indicating the actual structure *in* the metal rather than surface effects, which may conceivably be altered by the cold working associated with any polishing process.

The authors wish to acknowledge the courtesy of the Taylor-Winfield Corp. in furnishing most of the samples used for the microradiographs in this paper.

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[2] "X-Ray Photomicrography," by G. L. Clark, Photo-Technique, Dec., 1939.

[3] "The Technique of Microradiography and Its Application to Metals," by G. L. Clark and W. M. Shafer, Trans. Amer. Soc. Met., 1941, p. 732.

[4] "Technique and Applications of Industrial Microradiography," by G. L. Clark and S. T. Gross, Ind. Eng. Chem., Anal. Ed., vol. 14, p. 676 (1942).

[5] "Technique and Practice of Microradiography," by S. T. Gross and G. L. Clark, Industrial Radiography, vol. 1, No. 2, p. 21 (1942).

Effect of Carbon on Alloy Steel Ductility

. . . There has never been much data plotted to show directly the effect of carbon content on the ductility of steels quenched and tempered to a given hardness or strength. The author herein attacks this problem in a semi-statistical manner, using no original data (although a controlled experiment would be interesting). This work should be of interest to those metallurgists today confronted with a bewildering list of substitute steel.

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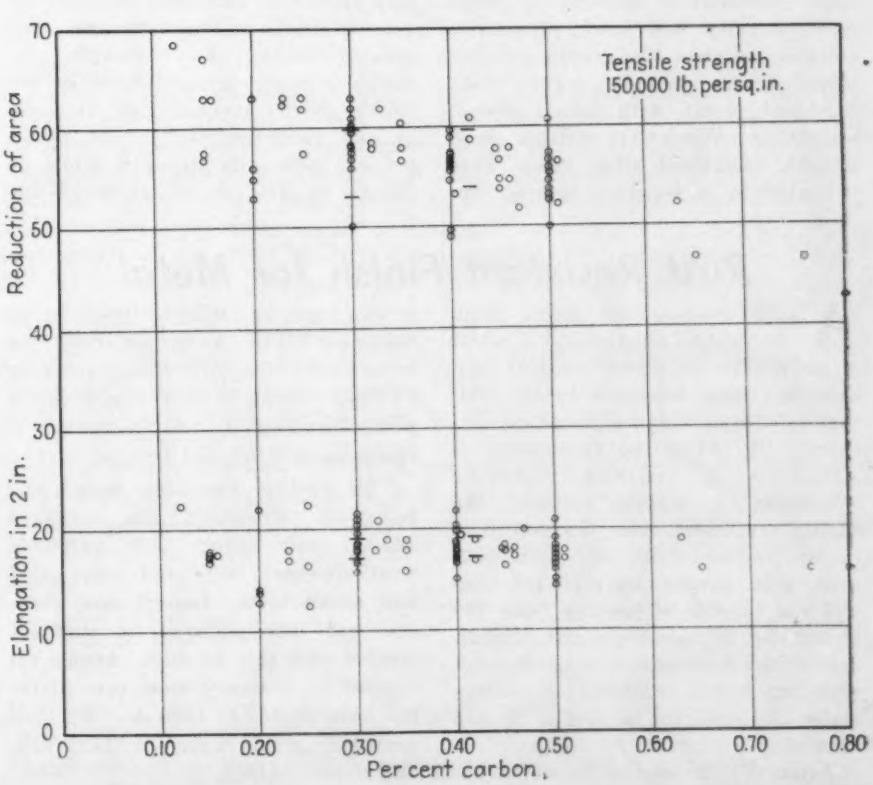
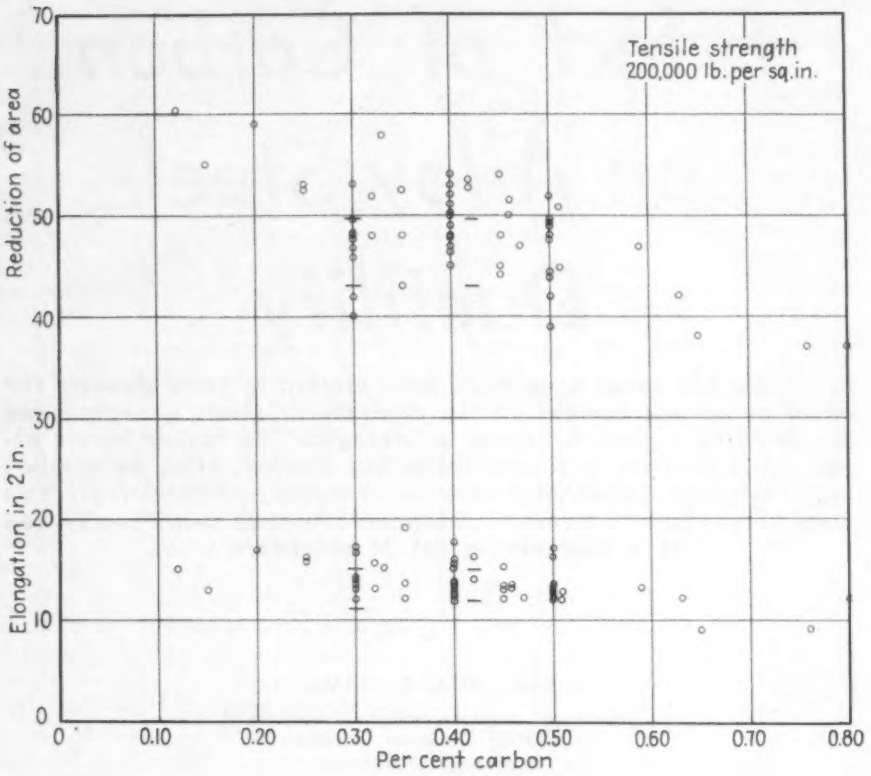
CONSUMERS of alloy steels of the AISI and NE types may frequently be asked to accept substitute steels of slightly different carbon content with the assurance that hardenability requirements will be met. But the question naturally arises: "If I quench and temper this new steel to the required strength, will I still get the ductility the specifications demand?" Or the metallurgist may simply get to wondering: "Just what is the effect of carbon content alone on the ductility of structures resulting from the tempering of martensite?"

The answer can be obtained by a few hours labor on the many SAE type tempering charts for particular steels to be found in the literature (for example, "Nickel Alloy Steels," "Molybdenum in Steels," "Bethlehem Alloy Steels," "Vandanium Steels and Irons," and numerous pamphlets issued by the American Iron and Steel Institute). However, the information has not been widely spread in the readily available form of charts showing ductility plotted against carbon content. Since the spread in published mechanical property figures is rather large, it requires the assembling of considerable data to indicate a significant trend. To save others the few hours involved, the accompanying graphs are submitted.

Elongation and reduction of area in the tensile test are shown as a function of carbon content. Fig. 1 is for steels fully quenched then tempered back to 150,000 lb. per. sq. in. tensile strength. Fig. 2 shows most of the same steels at 200,000 lb. per sq. in. tensile strength. With a few exceptions every point on the graphs represents data from charts, based on average, or "expected" values over many heats. These data were all from the sources listed previously. Data from the work of Janitzky and Baeyertz (See ASM Handbook, p. 515) are indicated as a range by the short horizontal lines at 0.30 carbon and 0.42 carbon. (Janitzky and





Baeyertz combined data from 0.40 and 0.45 carbon steels.)

Most points represent test bars fully quenched out before tempering. That is, they were hardened throughout and did not consist of a hard case and a soft core. Possibly, some exceptions to this occur in the low-carbon low-alloy ranges; however, obvious exceptions such as the shallow-hardening plain-carbon grades were immediately detected by their poor ductility and were, of course, omitted, because the graphs are not intended to include incompletely hardened steels with mixed microstructures. When first plotting these graphs, individual alloy types were indicated by a separate symbol, but no significant trend was observed. The types are not identified in Figs. 1 and 2; it will suffice to say that all the principal SAE types, several other alloy steels for similar uses, and four steels from the NE 8000 series are included.

Yield strength values from the same sources were plotted against carbon content in the same way, but are not submitted here, because the lare spread in published data is convincing that, on the average, they are unreliable. For example, one standard source gives 128,000 lb. per sq. in. as the average yield strength of SAE 6150 tempered to 150,000 lb. per sq. in. tensile strength, while an equally reliable source gives 145,000 lb. per sq. in. as the yield strength. The frequency of such discrepancies indicates that considerable care must be exercised in testing for yield strength (for example, selection of a standardized speed of testing, selection of sensitive strain measuring device, and care in alinement of specimen in the grips to get axial loading).

Hardness data were also plotted in the same way but showed no significant trend. The usual correlation with tensile strength appeared valid over the range of carbon content studied.

Returning to Figs. 1 and 2, the important practical conclusion is that, on the average, there should be no expectation of trouble in meeting ductility specifications because of a 5 or 10-point change in carbon content. An exception would be the case where there is already a few rejections for low ductility and it becomes necessary to go to a higher carbon steel.

It is interesting to note that reduction of area is slightly more sensitive to changes in carbon content (note greater slope of curves) and other factors (note greater spread). This is a true effect and not merely the result of the particular scales used in plotting; the same scale is used for both properties, because it is about equally probable to be correct to the nearest one per cent on the scale for both properties in the respective ranges considered. In other words, if something goes wrong, it will be found out when the reduction of area figures come in.

Fig. 2 would appear to indicate that at high strengths low carbon steels lose their slight advantage in ductility over the higher carbon grades. Data were also collected for a tensile strength of 100,000 lb. per sq. in., but showed the same trend as in Fig. 1 and hence are not reproduced here.

Rust Resistant Finish for Metal

A NEW coating for metal products known as Armor-Vit, which is essentially an alkali alumina silicate, has been developed by the Chicago Vitreous Enamel Product Co., Cicero, Ill. After the application of Armor-Vit by ordinary spraying equipment or dipping method, the curing treatment, best accomplished in an indirect-fired, air-circulating oven with proper temperature control and capable of heating from 750 to 800 deg. F., combines the ingredients of the coating into a hard, heat-resisting finish, insoluble in boiling water and resistant to most acids and alkalies.

Armor-Vit is applied in either one or two coats at 0.0005 to 0.0010 in. in thickness. For its application, the metal is cleaned by ordinary cleaning methods—alkali cleaner, acid pickling and neutralizing. Sandblasting is recommended for cast iron.

This coating has been tested and found to withstand the standard 200-hr. salt spray test, extended weatherometer tests and other acid and alkali tests. Impact and abrasion are also endured by surfaces treated with this product. Armor-Vit applied to ordinary steel test plates has been heated to 1200 deg. F., then quenched in cold water, without failure of the coating.

UNRETOUCHED picture of a section of exhaust pipe, a portion of which has been coated with ARMOR-VIT. The other half (left) bears no finish whatever. This badly rusted half is the result of exposing the pipe to the weather for five months.

Physical Properties of

Fiberglas Laminated Plastics

. . . Use of high strength filler material like fabrics woven from glass fiber in conjunction with a new type of "no pressure" thermohardening resin results in a laminated material that may be used to advantage in many airplane structural applications. The ability to mold large contoured assemblies with little or no pressure should show a substantial saving in cost and time required to fabricate many assemblies now made of sheet metal. This report was recently presented before the semi-annual meeting of the American Society of Mechanical Engineers at Los Angeles.

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THE aviation industry is vitally interested in high strength, low density materials which show promise of utilization in airplane structures. This interest exists because of the following reasons:

1. The need for the further reduction in weight of all types of airplanes in order to obtain better performance characteristics.
2. The need for increasing the rigidity of all thin gage sections to reduce local failures resulting from vibration and to maintain contours under all flight conditions.
3. The need for reducing the number of manhours required for the tooling, fabrication and final assembly of airframes.
4. The need for improvement in the overall smoothness of all aerodynamic surfaces.

It is generally agreed among aeronautical engineers that the development of a low density structural plastic material, capable of being molded in large assemblies with inexpensive molds, would help to satisfy the needs listed above. The word "structural" necessarily implies that the plastic material will possess certain minimum mechanical properties. For structural use in airplanes, the strength-weight ratios and other mechanical properties must compare favorably with corresponding values of the commonly used aluminum alloys.

Many new resins have recently been developed and doubtless countless others will emerge from the numerous chemical laboratories. These resins are being copolymerized and interpolymerized—they are being cast, molded and laminated with a large variety of fillers, organic and inorganic fibrous fillers—woven fabrics, macerated fabrics and the like. It has become exceedingly difficult for the engineer to choose from among these thousands of combinations any one material for a specific application. The need exists for reliable engineering data on plastic materials so that an intelligent selection of a material for a specific application can be accomplished. Considerable progress is being made in this direction by the joint efforts of the Army, Navy and the plastics industry, but much remains to be done.

Among the new resins which have become commercially available (military requirements first, of course), there are several thermohardening resins which are unique in that no external pressure is required during the process of molding a plastic part. These new resins may be used in combination with high strength filler materials to produce low density, high strength laminated plastics which soon may fulfill some of the needs which were enumerated above.

Use of "No Pressure" Resins

To produce a laminated plastic article from one of these "no pres-

TABLE I—Fiberglas continuous filament cloths used for MR-1A laminated test specimens.*

CLOTH DESIGNATION	NOMINAL THICKNESS IN.	WT-OUNCES PER SQ YD	WARP		FILLING	
			ENDS PER INCH	APPROX STRENGTH LBS/IN WIDTH	PICKS PER INCH	APPROX STRENGTH LBS/IN WIDTH
OC-63	.0115	9.12	46	875	12(Cotton)	3
ECC-11-127	007	6.36	42	412	32	334
ECC-11-148	012	10 95	30	625	19	459
ECC-11-161	.015	14.11	28	839	16	562

* DATA SUPPLIED BY OWENS-CORNING FIBERGLAS CORPORATION

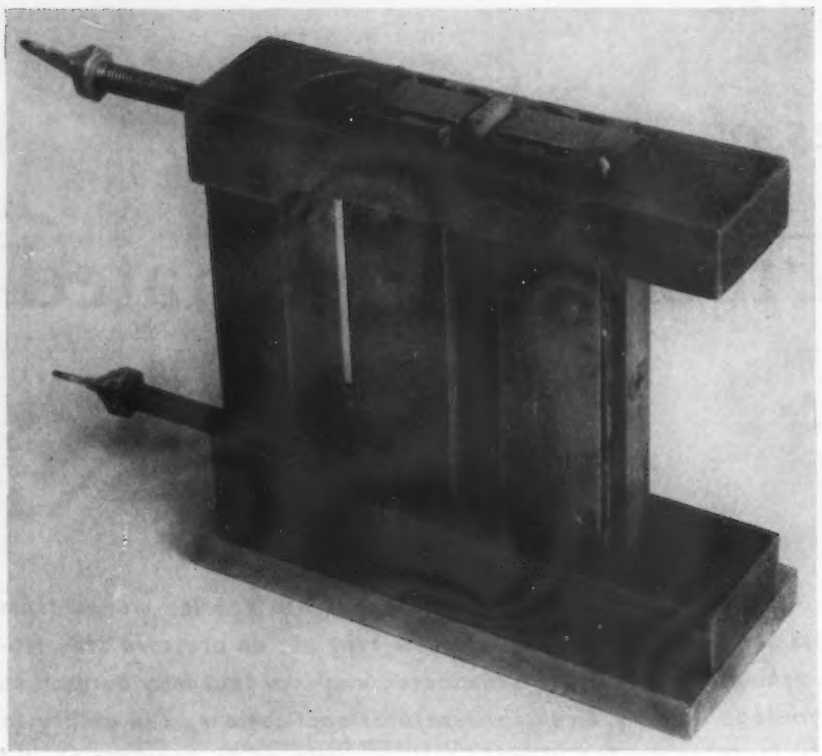

Fig. 1—Jig designed to test Fiberglas laminates in comparison.

sure" resins, one or more layers of the filler material may be wrapped around or draped over a mold. The filler material may be saturated with the liquid resin either before or after placing in contact with the mold. The laminate then is cured (hardened) by application of heat. Curing temperatures seldom exceed 240 deg. F. The curing period may require from 30 min. to 8 hr., depending upon the requirements of the particular resin, the thickness of the laminate and the heat conductivity of the mold. If a smooth, glossy surface is desired, non-porous cover sheets, such as Cellophane, may be used.

Parts having intricate shapes and double contours may necessitate the use of light pressure (0.1 to 10 lb. per sq. in.) to keep the impregnated fabric filler material in intimate contact with all surfaces of the mold and to prevent free resin from accumulating in localized spots. For application of these pressures, the use of thin transparent films of inexpensive thermoplastic materials has been found to be more suitable than the use of expensive synthetic rubber bags. Because of the fact that pressures are low, molds may be simple, light in weight, and inexpensive. The primary requirement is that they be made to correct dimensions and contours.

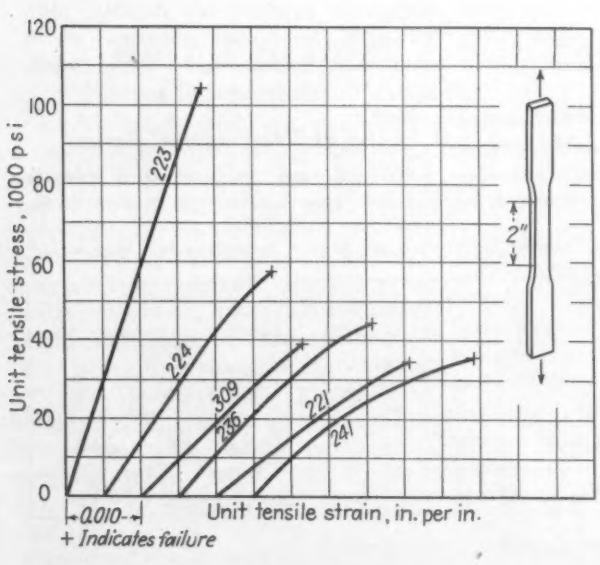

FIG. 2 — Stress-strain values for various Fiberglas laminates tested in tension. See Table 2 for physical properties and end-point values corresponding to the laminates designated.

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A preliminary study of the limited amount of available data, supplemented by various laboratory tests, indicated that the MR-1A resin[1], when laminated with certain of the Fiberglas fabrics, possessed better mechanical properties than any of the commercially available "no pressure" resins. Accordingly, a modest test program was undertaken by the Lockheed Structures Research Laboratory. Results reported are typical of data thus far obtained.

[1] *Manufactured by Marco Chemical Co., Philadelphia; laminated and distributed by Swedlow Aeroplastics Corp., Glendale, Cal.*

Physical Test Program

Table 1 gives specifications of four typical Fiberglas filler materials which were used in the preparation of flat sheet laminates, from which test specimens were machined.

Tension and bend test specimens were prepared and tested in accordance with the General Federal Specification for Organic Plastics, L-P-406, dated December 9, 1942.[2] Bearing stress-deformation data (See Figure 4) were obtained by use of a fixture similar to the one developed at the University of Kansas.[3] Ultimate bearing stress values were obtained from test specimens 2.50 in. wide, with 0.124 in. diameter holes centrally located at an edge distance of 0.375 in. The small compression test specimens were supported and tested in a jig designed by L. F. Bonza of the Lockheed structures research laboratory. This is shown in Fig. 1.

[2] *Section IV (Part 5) of Federal Standard Stock Catalog, Superintendent of Documents, Washington.*

[3] *Bearing Strength of Plastics and Plywood, by James Bond, Trans. A.S.M.E., January, 1943.*

The specimens were tested as received, at room temperature, and without special preconditioning. All tests were conducted in the Triplett & Barton Physical Testing Laboratories, Burbank, Cal.

Test Results

Typical test results are given in Table 2 and in Figs 2 to 5. Certain of these values, adjusted to an equivalent weight base, are compared with corresponding values of two aluminum alloys in Table 3. The specific

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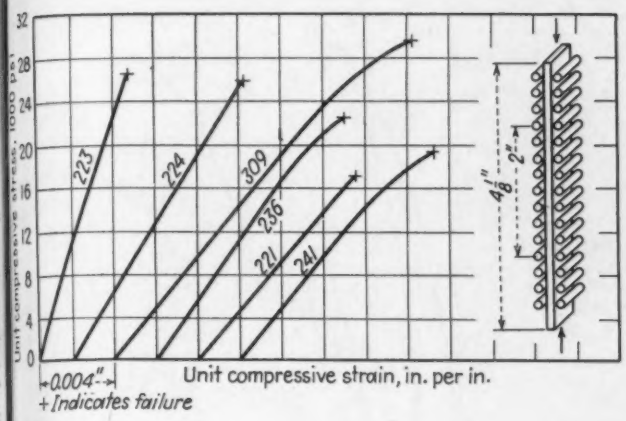

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FIG. 3—Stress-strain values for the same laminates as in Fig. 2, but tested in compression. (See Fig. 1 for jig design).

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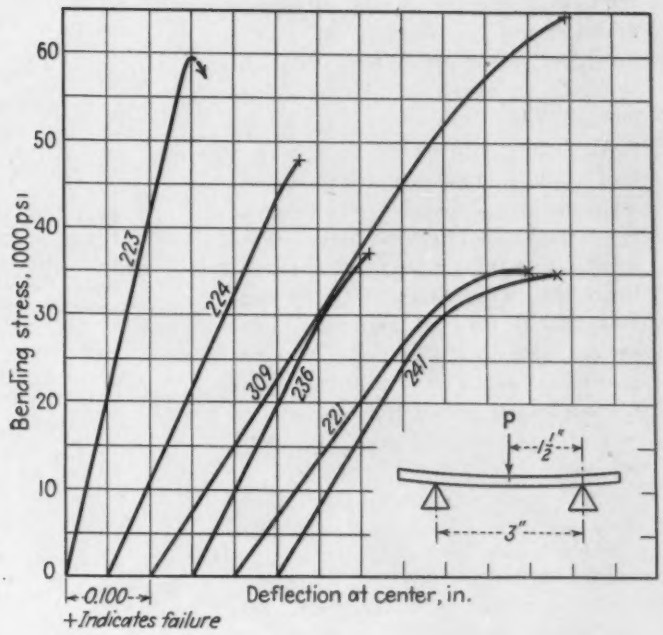

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FIG. 4—Results of beam tests on Fiberglas laminates. See also Table 2.

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TABLE 2
PHYSICAL TEST RESULTS—MR-IA FIBERGLAS LAMINATES

LAMINATE DESIGNATION	223	224	309	236	221	241
FILLER, FIBERGLAS NO.	OC-63	OC-63	OC-63	ECC-11-127	ECC-11-148	ECC-11-161
NUMBER OF LAMINAE	12	12	8	18	10	8
STACK ARRANGEMENT	PARALLEL	CROSSED 90°	CROSSED 90°	CROSSED 90°	PARALLEL	CROSSED 90°
NOMINAL THICKNESS, INCHES	.104	.107	.107	.128	.124	.121
SPECIFIC GRAVITY	1.96	1.93	1.69	1.81	1.80	1.79
TENSION						
DIRECTION OF LOAD	WITH WARP	—	—	—	WITH FILL	—
ULTIMATE LOAD, LBS.	6,390	3,140	2,095	2,840	2,070	2,210
SPECIMEN WIDTH, IN.	.604	.502	.502	.502	.482	.505
ULT LOAD PER INCH OF WIDTH PER LAMINA	880	520	520	315	430	550
TANGENT PROPORTIONAL LIMIT P.S.I.	50,000	32,000	21,000	26,000	13,000	13,500
01% OFFSET PROPORTIONAL LIMIT	58,000	41,000	25,000	27,500	15,000	15,500
2% OFFSET YIELD STRESS	—	58,000	—	38,700	30,800	24,300
ULTIMATE TENSILE STRESS	105,000	58,500	39,000	44,200	34,600	36,200
YOUNG'S MODULUS OF ELASTICITY P.S.I	5,960,000	2,800,000	1,900,000	2,100,000	1,500,000	1,900,000
ELONGATION AT FAILURE (% OVER 2 INCH LENGTH)	1.8	2.3	2.1	2.6	2.6	2.9
COMPRESSION (EDGEWISE)						
DIRECTION OF LOAD	WITH WARP	—	—	—	WITH FILL	—
ULTIMATE LOAD, LBS.	1,340	1,380	1,580	1,393	1,000	1,200
SPECIMEN WIDTH, IN.	.496	.500	.495	.500	.500	.500
ULT. LOAD PER INCH OF WIDTH PER LAMINA	225	230	400	155	200	300
TANGENT PROPORTIONAL LIMIT P.S.I.	26,100	25,950	21,500	14,000	11,000	10,000
01% OFFSET PROPORTIONAL LIMIT	—	—	23,700	15,000	14,000	12,000
ULTIMATE COMPRESSIVE STRESS	26,100	26,000	29,000	22,500	16,900	19,600
YOUNGS MODULUS OF ELASTICITY P.S.I.	5,500,000	3,000,000	2,260,000	2,800,000	2,200,000	2,300,000
DEFORMATION (% OVER 2 INCH LENGTH)	47	.86	1.38	.86	.75	93
MANNER OF FAILURE	DIAGONAL SHEAR	DIAGONAL SHEAR	DIAGONAL SHEAR	DIAGONAL SHEAR	DIAGONAL SHEAR	DIAGONAL SHEAR
BENDING (FLATWISE)						
LENGTH, WIDTH, THICKNESS, INCHES	5x1.02x.102	5x.745x.106	5x.749x.109	5x.751x.128	5x.751x.126	5x.746x.116
SPAN, INCHES	3	3	3	3	3	3
ULTIMATE LOAD AT CENTER OF SPAN, LBS	138	90	128	105	94	78
TANGENT PROPORTIONAL LIMIT P.S.I.	55,000	41,000	45,000	17,000	19,000	19,000
MODULUS OF RUPTURE, P.S.I.	59,300	48,200	64,800	38,400	35,500	34,900
MODULUS OF ELASTICITY, P.S.I.	5,950,000	3,000,000	2,100,000	2,300,000	1,630,000	2,080,000
BEARING						
HOLE DIAMETER	—	.124	.124	.124	.124	.124
NOMINAL BEARING STRENGTH (4% HOLE DEFORMATION)	—	28,000	23,500	20,000	29,500	23,300
ULTIMATE BEARING STRENGTH, P.S.I.	—	32,100	31,300	38,500	34,800	34,600

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strength properties of the aluminum alloys were computed from values published in the December, 1942, edition of "Strength of Aircraft Elements" ANC-5.

Attention is directed to the fact that these laminates are anisotropic, resulting from parallel stacking or cross-stacking (alternate laminae oriented at right angles) of unidirectional materials, such as OC-63 Fiberglas or bidirectional materials, such as are listed in Table 1. Results shown in Table 2 were obtained from specimens cut parallel to one of the two principal directions of the laminates.

Preliminary tensile tests made from specimens cut at 45 deg. with the principal directions of the cross-stacked MR-1A Fiberglas laminates exhibited ultimate tensile strength and tensile modulus values 30 to 40 per cent lower than corresponding "with grain" values.

Tensile tests made at room temperature from unfilled cast MR-1A resin (specific gravity 1.2) indicated an average ultimate tensile strength of 6200 lb. per sq. in. and an average tensile modulus of 370,000 lb. per sq. in.

The following data on other properties of the MR-1A Fiberglas laminates were supplied by the Swedlow Aeroplastic Corp. Methods of testing were stated to have been in accordance with A.S.T.M. specifications:

Impact strength, notched Izod, Ft. Lb./In. of notch	25– 100
Ultimate shear strength, psi.	14,000–33,000
Ultimate compressive strength, flatwise, psi	41,000–75,000
Moisture absorption, per cent	0.2–0.4
Gasoline absorption, per cent	0.01–0.15
Burning rate, In./Min.	0–.4
Hardness, Rockwell	71–107
Hardness, Barcol Impressor	40– 65
Heat distortion, deg. F.	300–350
Coefficient of linear expansion, 10^{-5} per Deg. F.	2.7–5.2

Fatigue and creep test data have not been determined.

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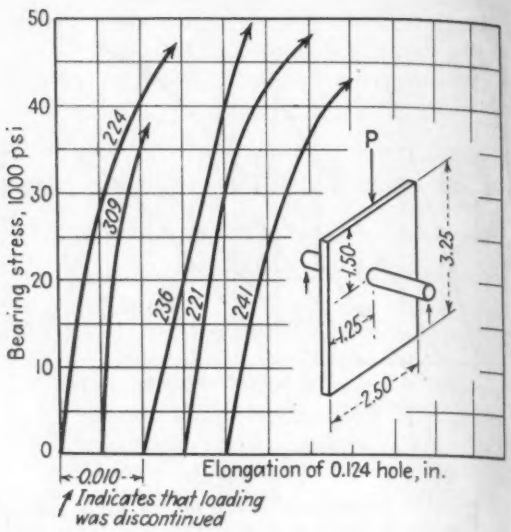
FIG. 5—These tests indicate the effect of rivet shear stress on yield of Fiberglas laminates. See also Table 2.



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It is interesting to compare test results on a basis of pounds load per inch of width per lamina with corresponding values of the Fiberglas cloth.

Directional Effects

Note that for the unidirectional laminate (see Table 2, Laminate No. 223) the ultimate tensile load per inch of width per lamina is 880 lb. and note from Table 1 that the nominal breaking strength of the OC-63 Fiberglas is 875 lb. For cross-stacked laminates of the same material (Nos. 224 and 309) corresponding values of 520 lb. were obtained; however, since only one-half of the laminae were oriented parallel to the direction of the load, these values could be expressed as 1040 lb. per in. of width for each lamina oriented in the direction of the applied load. Similar comparisons may be made with laminates made from the woven fabrics.

Attention is directed to the fact that both the thickness and density of the laminate are dependent upon the relative proportion of resin and filler materials. In tension, most of the load is carried by the filler material. Two laminates, each containing the same number of laminae, but varying in resin content might carry equal tensile loads, but because of the greater thickness would have different ultimate unit stress and modulus values.

Examination of the data will show that the resin content (low resin content results in high specific gravity values) for optimum tensile properties will not result in optimum bend and compression properties. This fact may be demonstrated by comparing data obtained on laminate No. 224 with corresponding data obtained on laminate No. 309.

Cost Limitations

The present high prices of Fiberglas cloths impose serious limitations on the use of these materials for simple structural applications. Many high strength organic and inorganic fibrous materials which recently have been developed or ones known to be in the developmental stage may offset this limitation. Moreover as compared with contoured structural shapes formed from flat metal sheets with expensive dies by drop hammers or hydropresses followed by manual assembly of these parts, the use of a suitable plastic material can save cost and valuable manhours of production time.

The author is indebted to Mr. L. F. Bonza for his assistance in the conduct of certain of the physical tests and in the compilation of test data which are included in this report.

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TABLE 3—Specific strength values MR-1A fiberglas laminates.

MATERIAL	① SPECIFIC TENSILE STRENGTH P.S.I.	② SPECIFIC TENSILE MODULUS P.S.I.	③ SPECIFIC BUCKLING STABILITY P.S.I.	④ SPECIFIC MODULUS OF RUPTURE P.S.I	⑤ SPECIFIC ULT BEARING STRENGTH P.S.I
MR-1A FIBERGLAS-223	53,500	3,040,000	790,000	15,400	–
MR-1A FIBERGLAS-224	30,300	1,450,000	416,000	12,900	16,600
MR-1A FIBERGLAS-309	23,000	1,120,000	435,000	22,600	18,500
MR-1A FIBERGLAS-236	24,400	1,160,000	388,000	11,700	21,300
MR-1A FIBERGLAS-221	19,200	833,000	280,000	10,900	19,300
MR-1A FIBERGLAS-241	20,200	1,060,000	362,000	10,900	19,300
24S-T ALCLAD ALUMINUM ALLOY	20,200	3,800,000	495,000	7,300	29,600
24S-RT ALCLAD ALUMINUM ALLOY	22,400	3,800,000	495,000	8,100	32,400

① Specific Tensile Strength = Ult tensile strength divided by specific gravity
② Specific Tensile Modulus = Tension modulus divided by specific gravity
③ Specific Buckling Stability = Flexural modulus divided by (specific gravity)^3
④ Specific Modulus of Rupture = Modulus of rupture divided by (specific gravity)^2
⑤ Specific Ult Bearing Strength = Ult bearing strength divided by specific gravity

War Finishes Dominate Electroplaters' Convention

. . . In this, the fourth and final part of the report of the American Electroplaters' Convention in Buffalo last month, unsolved electroplating problems are summarized, and papers on protecting steel with Fe_3O_4, blackening of non-ferrous metals, Hull Cell technique, radiant heat and control devices are reported.

"THE Black Oxide Treatment of Steel" was a paper read by William H. Price Jr., Mitchell-Bradford Chemical Co., who explained that the process under consideration involved the chemical creation, at relatively low temperatures, of the black magnetic oxide of iron, Fe_3O_4. This treatment is not a "plating" in the common sense of the word; it is not a coating on top of or dimensionally additive to the originally untreated piece of steel. It is a penetration into (without any dimensional changes) the surface of the steel to a depth of perhaps 0.0001 in.

The "blacking" bath is normally made by mixing one of a number of proprietary formulas, known as "blacking salts" with water. These salts are fairly high in caustic, or sodium hydroxide, content and usually also have other oxidizing ingredients in their make-up for the purpose of hastening (and reducing the temperature for) the oxidation of the iron in accordance with the equation:

$$3\ Fe + 2\ O_2 = Fe_3O_4$$

Bath temperatures ranging from 275 to 310 deg. F. are recommended by the producers of these salts, depending upon the individual formula under consideration. Concentration of the "salts" in the blacking bath, will vary from 7½ to 10 lb. per gallon of finished bath solution, again depending upon the particular salt used.

The equipment required consists of a plain steel tank supplied with a sufficient source of heat in the form of gas, high pressure steam or electricity. Into this tank are placed the blacking salts and water, properly proportioned; sufficient heat is applied to cause the solution to boil, and the bath is then ready to receive work.

Work to be given the black oxide treatment should be as chemically clean as though it were to be plated. Work may be done in baskets, on wires or trees or on specially designed racks. Work done in baskets usually requires that the baskets be shaken or disturbed once or twice during the blacking operation, to uncover any otherwise unreachable surfaces to the action of the bath.

Because copper, tin, zinc and other non-ferrous metals may inhibit or poison the blacking bath, all containers and implements used in the bath should be only of steel.

The work should be kept in the bath for about 10 to 15 min. Proper concentration of the bath is usually judged by the color of the emerging pieces. A gray color will ordinarily indicate the need for more salt in the bath. Laboratory or chemical test control of the bath concentration would be a difficult procedure and, from experience, is unnecessary.

Immediately after the blacking operation, the pieces treated are to be very thoroughly rinsed to free from caustic. Pieces containing folds, crevices or blind holes may, if not thoroughly rinsed, show a whitish salt crystallization in these places, for the bath is a supersaturated solution at room temperature.

Following the rinse, the work is subjected to a dip in one of many types of wax or oil. These may be petroleum hydrocarbon waxes or waxes which emulsify with water, or a so-called soluble oil may be used in conjunction with eight parts of water.

Some manufacturers of blacking salts recommend blacking in two steps and in two blacking baths, the first bath usually operating at a slightly lower temperature than the second. Other manufacturers call for a single bath immersion.

The very thin film of the black magnetic oxide of iron does not afford much resistance to corrosion. However, the black oxide film has the very definite property of either absorbing or adsorbing oils, waxes, etc., to the point that a combination of the black oxide and the oil or wax film produces a rust or corrosion resistance which is substantial in comparison with steel alone, or with steel coated with these same oils or waxes.

Properly handled, the black oxide film makes an excellent bond between steel and subsequent applications of paints, enamels, lacquers and varnishes.

Black for Non-ferrous

"Blackening of Non-Ferrous Metals" by Dr. Walter R. Meyer, Enthone Co., covered a class of work important in the war program for many reasons, including reduction of glare, increase in corrosion protection, chemical nonreactivity, identification and the formation of bases for organic finishing.

Most blackening of nickel has been done by the deposition of some other

metal or coating upon the nickel surface, for example, black nickel or black chromium plating.

A typical formula for black chromium is:

	Grams per liter
Chromic acid	350
Barium carbonate	5
Acetic acid	6

The solution is operated at room temperature and hence cooling facilities must be provided. The current density ranges between 1000 and 2000 amp. per sq. ft.

Another method of blackening nickel is to apply a thin film of zinc or copper and then blacken this film. The coating thickness should be at least 0.00005 in. To get an adherent film of zinc or copper, the activating treatment described by Donald Wood should be first used. This consists in using the following solution: Nickel chloride = 32 oz. per gal.; hydrochloric acid to keep the solution between 2 and 3 normal; anodes = electrolytic sheet nickel; time = ½ to 2 min.; room temperature; current density = 25 to 100 amp. per sq. ft.

An interesting method for the direct blackening of nickel has been described by B. B. Knapp in a patent assigned to International Nickel Co. Knapp's bath operates in the pH range from 1 to 2. A bath recommended is as follows:

	Grams per liter
Ammonium persulphate	200
Sodium sulphate	100
Ferric sulphate	10
Ammonium thiocyanate	5

Room temperature

The blackening of cadmium must be done by using solutions that deposit some other black metal, oxide or salt. For example:

	Oz. per gal.
Copper sulphate, crystal	2
Potassium chlorate	3
Sodium chloride	3
Temperature	140 to 200 deg. F.

Another method for blackening cadmium is to use buffered molybdate solutions which are available commercially.

High chromium and high nickel iron alloys are difficult to blacken directly and frequently must be blackened using the plating methods outlined for blackening nickel. However, Clements Batcheller has been awarded a patent for the direct blackening of stainless steels. The ranges of components are:

	Parts by weight
Oxidizing agent	3 to 15
Sulphuric acid (Sp. gr. 1.84)	36 to 50
Water	40 to 50
Temperature	190 to 210 deg. F.

The oxidizing agent may be an alkali metal manganate or permanganate, or manganese dioxide.

The blackening of aluminum is generally done best by producing a heavy oxide film by anodizing in a sulphuric acid solution and dyeing the film. Patents on this process are held by the Aluminum Co. of America.

As almost all salts of zinc are colorless, the formation of a black color on zinc requires the deposition of something that is black. Black nickel solutions are used to electrodeposit black coatings upon zinc and also to form black coatings by simple immersion. The essential components of the solution for immersion blackening are nickel, thiocyanate iron and the ammonium radical. These may be supplied by using various combinations of single nickel salts, double nickel salts, ammonium thiocyanate or other thiocyanates.

Buffered molybdate solutions are used very widely for blackening zinc. The pH range is from 8.5 to 9.5 and black coatings are produced in 1 to 5 min. in solutions operated from room temperature to 200 deg. F. Too heavy coatings tend to flake and too light coatings tend to fade to brown. Molybdate solutions are very susceptible to zinc oxides and contamination of the surface, and if electroplated zinc is to be blackened, it should be done directly after plating when the plate is clean and active.

The most generally used methods for blackening of copper and high copper alloys involve the use of sulphides. Unfortunately sulphide finishes have poor adhesion and ductility and are not very stable chemically. In addition, they are prone to undergo a recrystallization—so-called, "sulphur spotting."

There are several processes being widely used for blackening copper and its alloy. One method involves the direct oxidation of copper to cupric oxide in alkaline oxidizing solutions, and the other involves the use of ammonial copper solutions. Some blackening of small parts is being done by heating the work after a solution of cupric nitrate and nitric acid has been applied.

In the past year Dr. Meyer has developed a stable solution for the direct oxidation of copper and its alloys to cupric oxide and this process has been widely accepted by industry for the finishing of war goods. By the use of this solution, copper alloys containing 65 to 100 per cent copper can be blackened in 3 to 15 min. The solution is operated from 200 deg. F. to the boiling point which ranges from 218 deg. to 220 deg. F. The coatings produced have a velvety appearance as they come out of the solution and the coating is an excellent base for organic finishing, oiling or waxing.

The black coating protects the copper alloy from corrosion for 20 or more hr. in salt spray. Oiled coatings have withstood more than 200 hr. without showing any green corrosion salts. Copper plated steel is more resistant to corrosion when the copper plate has been blackened by this process.

Brass can be blackened by direct oxidation to cupric oxide in the manner described for copper (for alloys containing over 65 per cent copper) or by the anodic treatment of the brass in a strong solution of caustic soda (good only for those parts that can be racked or wired).

A generally used method is the so-called copper carbonate - ammonia method by which a film of cupric oxide with a bluish cast, about 0.00001 in. thick, is deposited. A typical formula is:

Copper carbonate	1 lb.
Ammonium hydroxide	1 quart
Water	3 quarts

Hall Cell Technique

"Plating Test Control of Plating Baths" a paper by F. MacIntyre and R. O. Hull electroplating division, E. I. duPont de Nemours & Co., described the use of the Hull cell for controlling plating solutions.

One of the fundamental practices in modern scientific investigations is the use of a model to predict or simulate behavior of similar, large units —whether the model be a pilot plant for a new chemical process, a small airplane for aerodynamic studies, or a miniature of the Mississippi River system to study silt deposition. This procedure has been applied to the development of electroplating processes and, what is equally important, to the control of plating baths. The paper described control of the common plating systems by determining the behavior of a bath sample in a specially designed small plating unit, the Hull cell.

Discussed in the paper are nickel, copper, zinc, cadmium, brass, chromium, lead, tin, silver and "Moly-Black" plating baths, although the principles of plating test control are equally applicable to the other plated metals, once the effects of each variable upon the Hull cell deposit are determined. It is emphasized that plating tests for solution control should be regarded as supplementing and confirming chemical analysis of the primary bath components. In many instances however, addition agents or impurities can be controlled or detected only by observation of the character of deposits

produced under definite standard conditions.

The Hull cell has been described before (see THE IRON AGE, June 29, 1939, p. 38) and details of construction were not repeated in this paper. The function of the cell is to provide by geometric configuration a cathode deposit on a flat surface that records reproducibly the character of electroplate produced at all current densities within the entire operating range. By measurement of the distance of the bright plating range from the end of the plate, the limiting current densities can be calculated from a formula or determined from a curve. Optimum current densities to use may be determined from the mid-point of the acceptable plating range. The limits of the ranges should not be construed to be average current densities for a plating tank, because almost any article in plating is subjected to a wide range of current densities simultaneously. Baths for still plating should show acceptable or good plating ranges from low to high current densities over at least one-half of the cathode plate area; baths for barrel plating should show an acceptable range over at least the lower one-third of the plate.

The plating cell as first described in 1939 has been modified to a smaller, more convenient size, and the curves and formula giving current density have been changed accordingly. The cell is so constructed that the flat cathode 2½ in. x 4 in. is maintained at a fixed, acute angle with the opposite side of the cell, permitting free flow of current to one end of the cathode, with gradual restriction of the cross sectional area for current passage to the other end of the cathode. The cell contains 267 ml. of solution. This volume was selected for convenience in calculations because 2 grams per 267 ml. of an addition are equivalent to 1 oz. per gallon at various points on the cathode plate for 1, 2 and 3 amp. total current. As an alternative to the curves, the following equation may be used.

$$A = C\ (27.7 - 48.7 \log L)$$

Where A = Current density at the selected point

C = total current applied to the cell

L = distance in inches of the selected point from high current density end of plate

The equation applies from L = ¼ to L = 3¼ in. only.

Plating tests can be made the basis for establishing the optimum concentrations of addition agents and the primary bath constituents and may be extended to include determinations of the effects of bath impurities, decomposition products of addition agents, accumulation of carbonate (in cyanide baths) and physical variables as temperature and pH. Experience has shown that a knowledge of the predictable facts about the composition of most plating baths is in approximate direct proportion to the extent of practice and observation in the use of the plating test. As an example, a single test cathode in a cadmium cyanide bath will yield the following information upon proper interpretation: Concentration of cadmium metal, sodium cyanide, sodium carbonate, caustic soda, and addition agent, identification of metallic impurities, and optimum current density range.

In addition to solution control, the Hull cell may be used in a very interesting manner to determine "covering power" or the lowest current density at which a deposit is produced. This application is similar to the "Cavity" scale (Young & Zminkoski Metal Finishing, Jan. 1943; L. C. Pan, Trans. Electrochem. Soc. *58*, 423 1930) but the Hull cell offers the advantages of simplicity and numerical measurement of covering power. For the purpose, it is usually convenient to plate for a given length of time, for example, 1 min., with a total current on the cathode of only 0.2 amp. This gives a current density range from about 12 to 0.4 amp. per sq. ft. which conveys visibly on the plate an accurate indication of the minimum covering current density as well as illustrating the remarkable effect of certain addition agents in either improving or decreasing covering power.

Automatic Control Devices

"Installing Equipment to Obtain the Greatest Amount of Automatic Control and Handling" was a paper by G. E. Heunerfauth, Crown Rheostat and Supply Co., pointing out that one of the first devices to help produce a uniform plate, load after load, was the clock dial, and later the modified alarm clock. These were for the purpose of showing when the work was to be taken from the tank, but there was no assurance that it would be. Later, other instruments including watt-hour meters, recording ammeters, automatic temperature controls and various other instruments were used to obtain uniformity.

Two methods of obtaining uniformity of plating are: Controlling the exact length of time of the plating current by shutting it off automatically at the end of a predetermined time—the work being loaded and unloaded manually; and handling the work mechanically, as in a full automatic conveyor, thus giving uniform treatment in each tank.

A simple way to obtain uniform plating on manually handled work is to install a generator or rectifier direct to each tank. Then by placing a timer or delayed relay on the coils of the magnetic starter, the operator can start the plating after loading the tank and, at the end of a given time, the current will be automatically shut off. These timers are made in different ranges. Upon removing the load the operator would press a button which would automatically reset the time. Most of these timers cost in the neighborhood of $50.

Another method of obtaining uniform treatment is the automatic transfer of work as in a full automatic conveyor. Some of the many advantages of this type of equipment are uniformity of plate, less dragout, and lower labor cost. The disadvantages, however, are high first cost of the equipment, the need of a large production of parts that can be racked on approximately the same type of rack, and the fixed cycle of treatment which, in most cases, prohibits making a change.

The semi-automatic tank gives uniform plating time along with an even flow of work, but it has the disadvantage that hand operations are used through the cleaning and rinsing cycles, giving an irregularity of treatment and a large amount of dragout with nearly the same labor cost as in all manual operations.

In order to overcome the disadvantages of manually cleaning with the semi-automatics, a unit type of transfer can be used. Such a unit is a single transfer capable of handling several tanks at one time. Thus the complete cycle of cleaning, plating and rinsing becomes automatic except for the manual transfer between machines. In addition to uniform treatment, more flexibility and lower cost are obtained as compared with the full automatic. With this type of unit, a great variety of layouts can be had, depending upon the size and number of racks an hr. to be handled. This type of unit also has the advantage that it can be easily taken down and moved. The plating cycle can be divided into units with manual transfer between units, giving a greater degree of flexibility.

Salvaging Rejected Parts

"Industrial Salvage by Electroposition" was described by Ovide G. Hogaboom, New Britain Machine Co., New Britain, Conn. There are more than chips and turnings in the scrap pile. There are over-machined and worn parts that can be salvaged by electrodeposition, he pointed out.

This type of electrodeposition is

primarily nothing more than ordinary electroplating except that its aim is not a thin decorative coating, appealing to the eye. In reclaiming machine parts, the point is only to restore the spoiled dimensions with a suitable thickness of metal that will withstand the service to which it is put.

On machine parts, the spoiled or worn pieces are separately racked and lacquered with a stop-off which masks the sections not to be plated. The work is cleaned, pickled or etched, and plated with copper, nickel, chromium, iron, or an alloy directly upon the base metal without any under coating at all. To make an individual rack for each type of machine part that enters the salvaging department would be a tremendous job. Each plater has to work out for himself, through experience, which types of rack to suit his particular needs the best.

For instance, to plate sleeves or blocks, a very simple rack or holder can be used; ⅛ in. x 1 in. flat stock, either copper or iron, with a hook on one end to hang on the cathode bar and a ½ in. or suitable hole drilled through the lower end whereby the work is fastened by a nut and bolt, or just a bolt if the hole in the work is threaded. Care must be taken so that gassing will not form pockets under recesses and stop plating at these sections, or that the rack is not so close to the plating area as to cause shading.

A simple hook can be used for many jobs. For inside dimensions an auxiliary anode can be attached by means of a piece of bakelite. The inside anode is to be suitable for the type of deposit required, such as copper tubing for copper plating, lead pipe for chrome plating, etc. Both the anode and the work are connected to the main bus bars on the tank through battery clips or heavy electric welding clips when necessary.

On long parts to be salvaged such as gibs or extremely heavy parts that can fit into the plating tank, two simple hooks are used, with nuts and bolts making solid electric contact to the work as well as solid mechanical contact, so that the stop-off lacquer will not break away as it would with a plain "S" hook and allow metal to be plated on spots not desired. However, "S" hooks and baskets are used to clean work prior to racking and lacquering.

After racking, the piece is dipped in stop-off lacquer which dries in 15 min.; then a second coating is applied and left to dry for ½ hr. The lacquer is easily cut with a pen-knife from the section to be plated. To remove the lacquer remaining after plating, the work is immersed in hot water for several minutes to make the lacquer pliable, then entirely peeled off with a knife or blown off by compressed air.

A further use for a simple hook is to support spindles, shafts or gears which have no bolt holes, by a split ring which clamps around them. Outside dimensions can thus be plated; and with an auxiliary anode, inside dimensions can be plated on single pieces or a group. For extra heavy and large pieces where such a rack might slip, the shape of the article may call for the use of a stronger hanger and split ring.

For large bushings and similar pieces, a simple bent rack can be used with two cross pieces attached by a bolt. On small bushings, rubber or wooden plugs are inserted in both ends. A copper or iron wire under one plug is all that is required for support and contact. Two bent hooks are used on large and heavy pieces.

For inside dimensions, one hook can be used with an anode held through the bore, either from a separate support on the tank or attached to the rack by a strip of bakelite. In similar manner heavy pieces can be hung on two hooks.

Besides these ordinary jobs, there are many cases where special technique is employed. An "irrigation tank" is used to plate part sections of outside dimensions without applying stop-off lacquer. Also, studs may be set on a level metal strip for contact, insulated from the bottom of the small tank by a sheet of rubber, bakelite or glass. The solution level is controlled to the required depth by an adjustable overflow.

When a blind hole has to be plated, and even though the work is fully submerged in the plating bath, the solution within the hole must not be allowed to become depleted. For copper plating, rubber tubing is used to connect the copper anode pipe to a circulating pump. In chromium plating where rubber cannot be used, a lead funnel is burned to the top of the lead anode pipe to catch the chrome solution flowing from a pump or reservoir.

Many times the work is larger than an office desk, and it would be impossible to put it in a small plating tank. Here the solution is "irrigated" through the bore to be plated; making the bore itself the plating tank. An iron tube is placed around the top edge of the bore and is equipped with a small overflow pipe.

Of course, if there is no bottom in the bore, a wooden plug is inserted part way or fastened underneath the hole. It is then more convenient to pump the solution through a hole in the wooden plug than through the anode itself.

In chrome plating sections of the interior of large spindles which do not fit into the tanks, a "tooter" can be used: an inverted lead funnel used as anode and with air bubbling up from underneath it to cause agitation and flow of the solution. The "octopus anode" for chrome plating can be used for intricate work that has many holes, recesses or teeth to be plated.

Production racks with conforming lead anodes can be made for reclaiming tools by chrome plating, the same as for chromium plating new dies, gages and drills.

For building up machine parts by iron deposition, a hot ferrous chloride or a cold ferrous ammonium sulphate bath can be used. The ferrous chloride bath is preferred for soft, ductile and heavy deposits. This pure electrolytic iron can be carburized and hardened if necessary.

Radiant Heat Techniques

"Radiant Gas Heat in Baking, Curing and Drying Operations" was a paper given by C. P. Mann, Selas Co., who said that probably the most significant progress made in recent years in the industrial application of heat to baking, curing and drying operations has been in the field of radiant heat. Today, radiant energy for such application is being produced by the infra red lamp, in which the lamp filament is heated to incandescence by electricity and the resultant rays directed by suitable reflectors; by the radiant gas burner, in which a gas flame is directed along a ceramic surface which, by its insulating qualities, becomes incandescent, thereby converting the heat into radiant energy and making available for further use more of the heat of combustion of the gas.

The gas used for this purpose may be any of the commercial forms of natural gas, manufactured gas, mixed gas, or liquified petroleum gases, but the burners used must be designed both for the particular type of gas as well as for the particular application. The design of a radiant burner includes also the formulation and manufacture of special ceramic materials and their shaping and forming. Several standard forms have already been developed which can be adapted to a variety of classes of work, but modifications and changes are constantly being made as new applications and special problems are presented.

Radiant energy possesses certain specific characteristics which are con-

stantly being studied. One of these is that radiant energy is inherently directional; therefore every application being considered for this type of heat must be studied from this viewpoint. Again the efficiency of radiant heat application is greatly affected by the absorption factor of the work under process. This means that the efficiency of radiant heat transfer is affected by the color and polish of the work pieces; white and high polished surfaces reflect radiant rays, black and unpolished surfaces absorb them, while other colors, yellow, red, blue, etc. fall between these.

Radiant heat responds very readily and rapidly to control, due to the fact that rays travel with the speed of light.

Considering first that radiant heat is directional, it is immediately apparent that radiant sources must be so placed that their rays are directed toward work in process. This frequently presents a major problem because the work piece may be of such an irregular shape or in a succession of work pieces, each may be so located relative to the other, that shadows are thrown on parts of the work pieces. Also, it is frequently necessary to use a single oven for several different kinds and shapes of work pieces, which further complicates the problem because radiant sources so placed that they are very effective for one work piece may not be so satisfactory for another. This situation may be met by routing the work pieces through the oven in batches, each batch carrying pieces all alike, and then arranging the radiant sources so that certain groupings will be used for certain pieces, and other groupings for other pieces. The general trend however, is to design an oven for a particular work piece.

With radiant burners, it requires 20 per cent more time to cure a finish on a polished surface than on an unpolished surface.

The distance between work piece and heat source is of great importance in using radiant heat. In curing synthetic finishes, an increase in this distance from 6 in. to 10 in. will extend the curing time as much as 500 per cent, depending somewhat on the type of finish. In applying radiant heat, therefore, the rays must strike all finished surface from approximately the same distance. This same principle also holds true in baking and drying operations.

One important fact to be kept in mind, whether considering radiant or convection heating, is that the work piece itself must be heated up before finish curing processes can be completed. This fact is frequently overlooked or disregarded in planning the use of radiant heat—but actual tests demonstrate the fact conclusively. A further interesting observation is that the shorter the curing time of a piece, the greater is the cure retarding effect of increasing weight of a piece, for a given external area. For instance, doubling the weight of a piece which has a curing time of 2 min. will increase this curing time 50 per cent, while doubling the weight of a piece which has a curing time of 6 min. will increase this curing time only 32 per cent.

If we consider rate of production per unit of floor space, the convection oven will have the highest capacity, and the infra red lamp the lowest. If, however, the work in process is such that the products of combustion of the radiant gas burner can be allowed to combine with radiant heat in the oven, then the production rate of this combination will be highest of all.

From the viewpoint of cost of equipment, the infra red lamp is cheapest, the radiant gas burner next and the convection oven the most expensive.

One of the most recent applications of radiant gas burners in the steel industry, brought about by necessity of conserving tin, has been the development of a new method of tinplating. This new procedure consists in electrodepositing tin on sheet metal strip, subsequently heat-flowing the tin in order to seal the pores of the tin deposit, obtaining a bright smooth surface for better printing, and for fusing the tin to the sheet metal. This new method affords protection to the base metal comparable to the heavy dip process formerly used, at a saving of 2/3 of the tin. Here again radiant gas burners find an especially advantageous application because of their extremely high rate of heat transfer. Even at this early date, metal strip speeds in excess of 300 ft. per min. have been attained.

Infra-Red Heating

"Infra Red Applications in War-Time Industry" were described by W. S. Crandall, Fostoria Pressed Steel Co. The infra red process of heat transfer is relatively young. First discovered and used as an industrial tool by the Ford Motor Co. for baking the prime and finish coats on their automobiles, it has since been put to many new uses in industry, and its application has covered a wide span of industrial products.

To name a few of the wartime products to which infra red has been successfully applied: the baking of primer coats and finishes on aircraft engines and propellers; drying dope on aircraft fabrics; the curing and baking of insulating varnishes on motor stators, armatures and field coils; the baking of prime coats and finishes on jeeps, army scout cars, trailers, ambulances and other vehicles used by the armed forces. The process has also been successfully applied for setting up resins in plastic bonded plywood aircraft construction, and for drying and setting up glues in the joints used in this type of construction.

Other important new uses include the drying of green sand molds in the foundry industry; the precipitation of silver in the mirroring solution onto plate glass in the mirror industry; the preheating of plastic granules prior to moulding and the softening of thermoplastic materials prior to punching and shearing.

The development of drying lamp sources, as yet not out of the laboratory, the design of new reflector equipment still on the designer's table, and new application techniques all make it conceivable that temperature ceilings hithertofore never attained will open to this process many fields which may even embrace metallurgical applications in the heat treatment of alloys, as temperature ranges are predicted in excess of 1000 deg. F.

Unsolved Electroplating Problems

"Commercial Electroplating Past and Future" was outlined by E. W. Cochran, National Cash Register Co., who advocated post-war conservation of materials and decried the dumping of between 20 and 50 per cent of nickel and chromium plating materials down the sewer, in the past, pointing out that there are available now resins with absorbtive properties that are controllable. He also deplored the fact that in chromium plating, 80 to 90 per cent of the current consumed is devoted to the releasing of hydrogen into the air.

Other problems to be considered, he said are:

What are to be the relative positions of zinc and cadmium after the war?

Are the ancient salt spray results still going to influence the general choice of material?

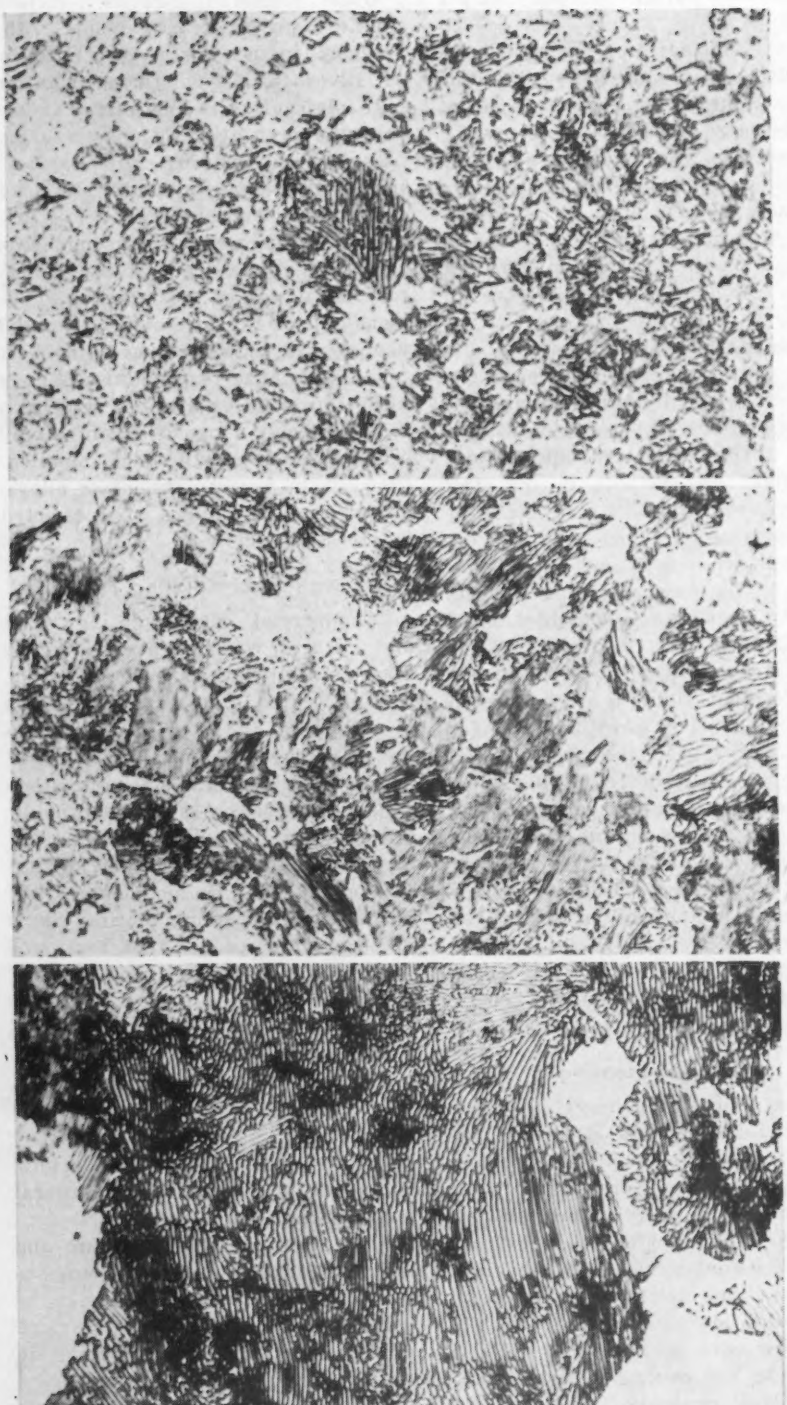
What place are the phosphate and superficial oxide coatings going to have in the future? Are they to be considered as competitive with zinc and cadmium, or are they going to establish a place of their own?

What place will alloy baths have in plating departments?

When materials again become plentiful, will tin be hot dipped again, or will plating solutions and procedures

(CONTINUED ON PAGE 128)

The Annealing of St



44a

44b

44c

FIG. 44—Effect of austenitizing temperature on microstructure of annealed A 4042 steel. All samples were completely transformed at 1250 deg. F. The sample shown in photomicrograph 44a was austenitized at 1385 deg. F., that in 44b at 1500 deg., and that in 44c at 1700 deg. Electrolytically polished, etched in picral; magnification 1000 diameters.

FOR most machining operations on parts made of annealed medium carbon alloy constructional steels, a lamellar structure is preferred[21]. Occasionally, though, for cold working operations, a spheroidal structure is required in these steels. In tool steels a spheroidal structure is almost always desired[22]. The production of either a lamellar or a spheroidal structure in most steels depends primarily on the austenitizing temperature, as indicated in Rule 1. In some of the high alloy steels such as the hot work steels, the air hardening die steels, and high speed steels, in which many residual carbides exist even at very high austenitizing temperatures, a lamellar structure cannot be produced. On the other hand, in many of the low alloy medium carbon steels the production of a completely spheroidal structure requires special care. Otherwise, the rule is quite general: Low austenitizing temperatures, that is, within 10 to 50 deg. F. above the critical, are conducive to the production of completely spheroidal structures, and high austenitizing temperatures, that is, 200 to 400 deg. F. above the critical, are conducive to the production of completely lamellar structures. A few examples of the effects of austenitizing temperature are shown for four different steels in Figs. 44 to 47.

Spheroidal Structures By Preheating

With many steels in which a completely spheroidal structure is difficult to obtain with the regular procedure, an austenitizing at a temperature about 10 to 50 F. above the critical followed by a transformation at a temperature about 20 deg. to 100 deg. below the critical, it has been found that a preheat is very helpful. This is mainly applicable to hypoeutectoid steels, but it has also been useful in some low alloy hypereutectoid steels. This treatment consists of heating the steel at a temperature about 25 to 100 deg. below the critical before the steel is austenitized. The preheat may be followed by a cooling to room temperature, before the autenitizing heating, but obviously

Steel

. . . Concluding his five-part article on application to annealing of the modern view point on the transformation of austenite, the author discusses the effect of austenitizing temperature on the production of lamellar and spheroidal structures, and the practical application of TTT information to the annealing of forgings and large loads of steel. In addition he summarizes the principles previously presented.

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By PETER PAYSON
Chief Research Metallurgist, Eastern Research Laboratory, Crucible Steel Co. of America

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it is more economical to hold the steel at the preheating temperature and then to raise it immediately to the austenitizing temperature.

The purpose of the preheat is to agglomerate the carbides in the steel so that they will be more resistant to solution in the austenite during the subsequent heating. The presence of undissolved carbides, or carbon concentration gradients, in the austenite, as pointed out by Mehl[4], is conducive to the formation of a spheroidal, rather than a lamellar structure, when the austenite transforms. This treatment has been found effective in 0.40 to 0.80 carbon, plain carbon steels; in 4063; in 4650; and in Cr-W-bullet steel; although it was not effective in 9260.

Austenitizing Time and Dead Soft Steel

It was found that hypereutectoid steels can be made extremely soft if they are held for a long time at the austenitizing temperature. Although the actual hardness differences due to the effect of time at the austenitizing temperature are small, such as a change from 241 to 229 brinell, the effect on machinability or cold-forming properties may be appreciable. Some data are shown in Tables II and III.

The effectiveness of the long time austenitizing is due to the agglomeration of residual carbides in the austenite, the coarser the carbides, the softer the final product.

It should be pointed out here that steels which are approximately of eutectoid carbon content tend to form a lamellar transformation product if the steel is austenitized for a very long time. This follows from Rule 1. Long holding at a temperature, say 25 deg. F. above the critical, will be as effective for dissolving carbides and dissipating carbon concentration

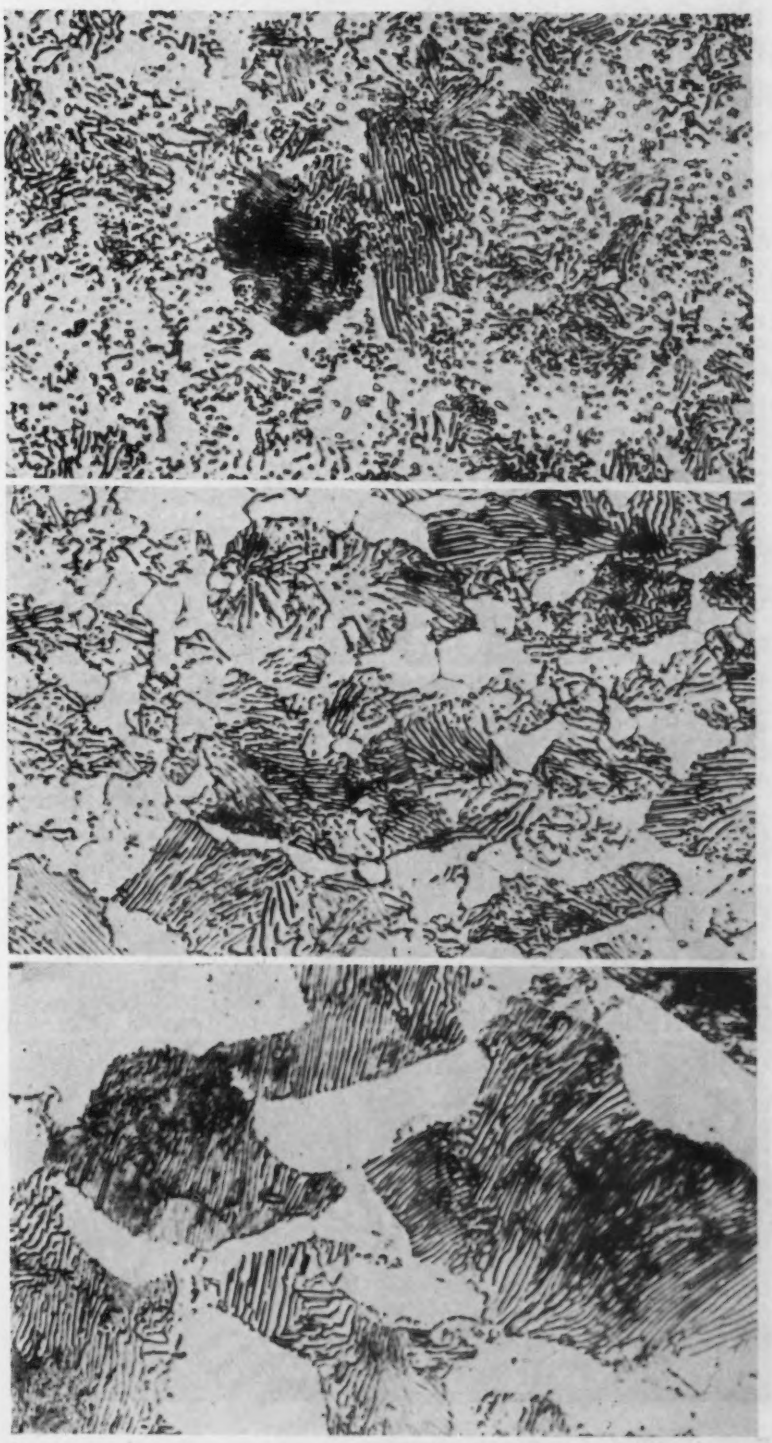


FIG. 45—Effect of austenitizing temperature on microstructure of annealed A 3140 steel. All samples were completely transformed at 1250 deg. F. The sample shown in microphotograph 45a was austenized at 1410 deg., that in 45b at 1500 deg., and that in 45c at 1800 deg. Etched in picral; magnification 1000 diameters.

gradients as a short heating at a temperature about 100 deg. above the critical[23].

In some grades of steel, like Ketos, an increased preheating time is more effective in decreasing the hardness of the annealed steel than increased austenitizing time. In others, like Crucible Double Special, preheating is much less effective than austenitizing time. In chromium bearing steel, both preheating and long time austenitizing are effective in lowering the hardness of the annealed steel. The effects of variable preheating and austenitizing times on the size and distribution of residual carbides in chromium bearing steel are shown in Fig. 48. This indicates that there are less fine carbides and more medium size carbides in the sample preheated at 1380 deg. for 14 hr. before it was heated to 1410 deg., than in the sample heated directly to 1410 deg. (Figs. 48c and 48a); that a similar contrast holds for the sample heated for 33 hr. at 1410 deg., rather than 4 hr. at this temperature (Figs. 48b and 48a); and finally, that a long preheat followed by a short austenitizing is more effective in producing an "open" distribution of residual carbides, than an equivalent time spent at the austenitizing temperature (Figs. 48d and 48b). The beneficial effect of the preheat in producing in this grade a very soft "open" structure of coarse carbides is illustrated in Figs. 49a and 49b.

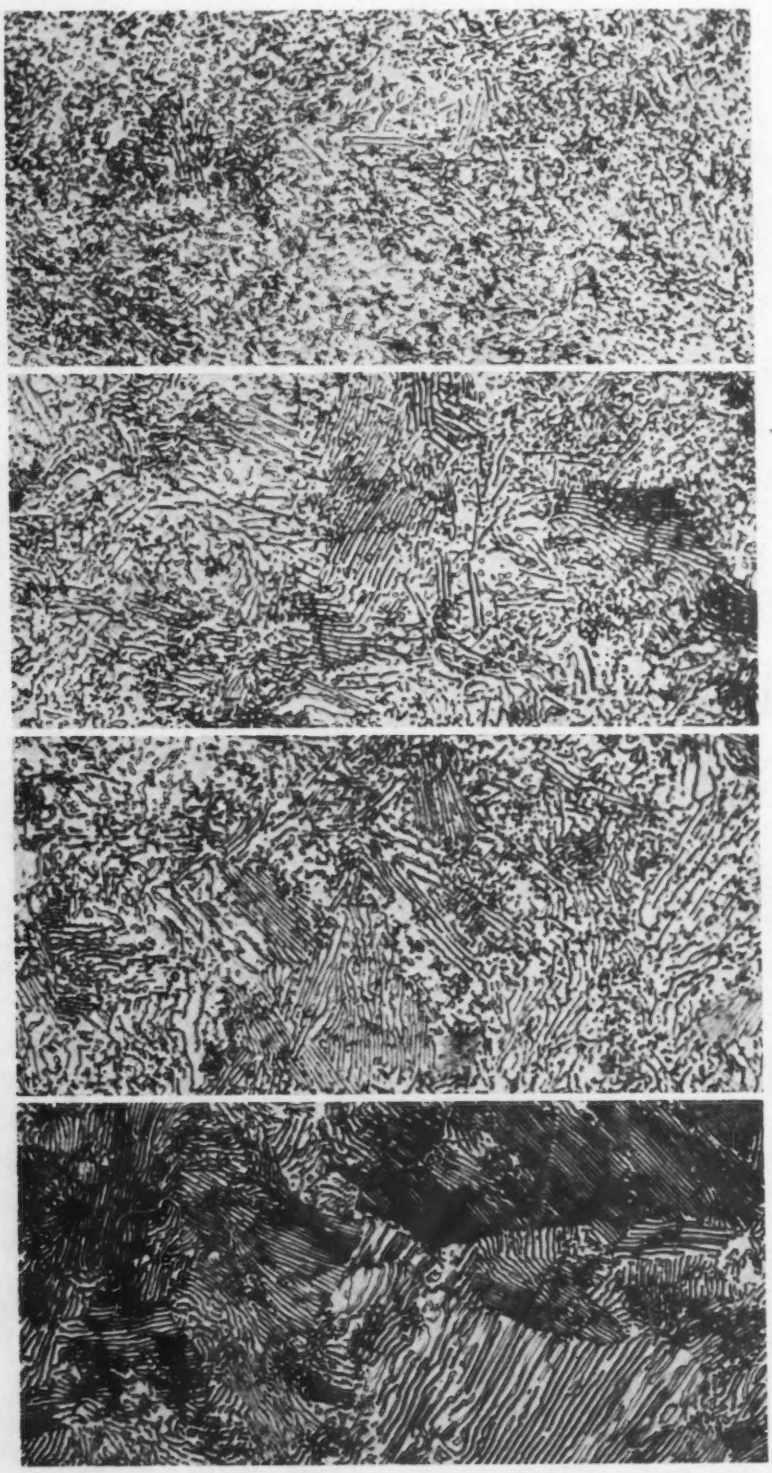


FIG. 46—Effect of austenitizing temperature on microstructure of annealed E 4160 steel. All samples were completely transformed at 1300 deg. F. The sample shown in microphotograph 46a was austenitized at 1450 deg., that in 46b at 1475 deg., that in 46c at 1500 deg., and that in 46d at 1550 deg. Etched in picral; magnification 1000 diameters.

Banded Structure Control

Because of the unavoidable segregation which occurs in alloy steels during the solidification of ingots, it is to be expected that the composition across the section of a bar would not be altogether uniform. Although carbon diffuses fairly rapidly in austenite, the elements Mn, Ni, Cr, etc., diffuse very slowly[24] and therefore it is practically impossible to establish by heat-treatment a uniform austenite in alloy steel. As a result of this lack of homogeneity, the austenite does not always transform uniformly. It has been found that ferrite in hypoeutectoid steels separates in bands under some conditions of transformation, and as a network under other conditions. This is illustrated in Fig. 50.

When 3312 is austenitized at 1600 deg. and then transformed at 1200 deg., the ferrite comes out in distinct bands, as shown in Fig 50a. When the same steel is transformed at 1150 deg., the banding is much less distinct, as in Fig. 50b, and when the transformation takes place at 1100 deg. there is very little indication of banding, as seen in Fig. 50c. There is as yet no good explanation for this behavior. It is probably associated with the relative rates of nucleation and growth of the proeutectoid ferrite, and the ferrite-plus-carbide aggregate at the various transformation temperatures. If the ferrite-plus-carbide constituent forms soon after the separation of the ferrite, banding does not occur. If the ferrite forms much earlier than the other constituent, there is apparently a diffusion of carbon from the regions rich in elements

like P, Si, Ni, and Al, which do not form carbides, to regions rich in carbide-forming elements like Mn, Cr, W, Mo, etc.[25] Thus, the bands are formed at high transformation temperatures 1200 and 1150 deg. where, as shown in Fig. 20, the spread between the ferrite line and the line for the beginning of the ferrite-plus-carbide formation is large, but not at 1100 deg. and lower, where the two lines are relatively close together. It follows from this consideration that the faster the cooling through the high temperature region, the less opportunity there is for the formation of ferrite bands. For the production annealing of low carbon alloy steels in which a minimum of ferrite banding is desired, it is advisable to cool the steel in air from the austenitizing temperature to the approximate transformation region.

Tempering Treatments

There are some steels which develop a suitable structure for machining by a tempering treatment. The advantage of a tempering annealing treatment is its simplicity, since it involves merely heating to and holding at a subcritical temperature, followed by a cooling in air. The final structure obtained depends, of course, on the original structure of the steel. If the original condition is medium to coarse lamellar pearlite, the final structure will be a mixture of spheroidal and lamellar carbides in ferrite. If the original structure is fine pearlite or intermediate products like mathewsite,[26] or bainite or, as is possible in the more highly alloyed steels, martensite, then the final structure will be fine spheroidal carbides in ferrite. Usually these structures obtained by tempering are relatively hard, even though the holding at the tempering temperature is relatively long.

There are some steels which have extremely sluggish reactions at relatively high transformation temperatures, and such steels can be softened only by tempering treatments. The 16 per cent chromium, 2 per cent nickel, Type 431 stainless steel is a good example of this kind of steel. The best annealing treatment found for this steel is a double treatment consisting of a holding at 1400 deg. followed by an air cool, and then reheating at 1200 deg. followed by an air cool. The first treatment is to agglomerate carbides at a temperature over the critical, and the second is to temper the martensite formed during the cooling from the first treatment.

In some steels, especially the higher carbon alloy constructional steels like 3250, 4350, and 4650, in which a completely spheroidal structure is desired, together with a hardness of less than 200 brinell, a tempering treatment is used as part of the annealing procedure. A relatively coarse spheroidal structure is obtainable in these steels at high transformation temperatures, but the rate of the transformation at these temperatures is very slow, and the transformation is not complete even after 10 to 15 hr. A satisfactory procedure is to transform the steel to a large

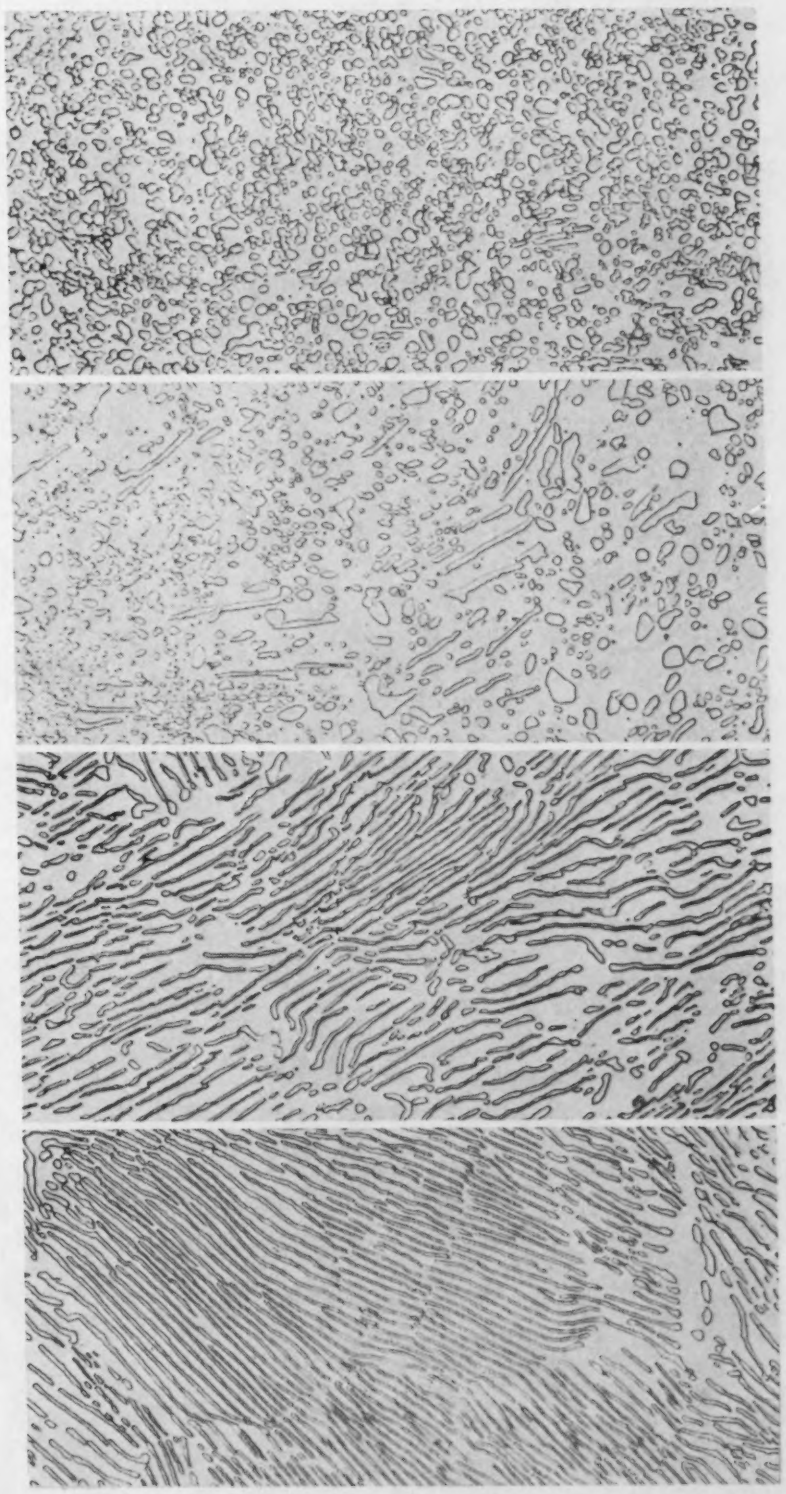
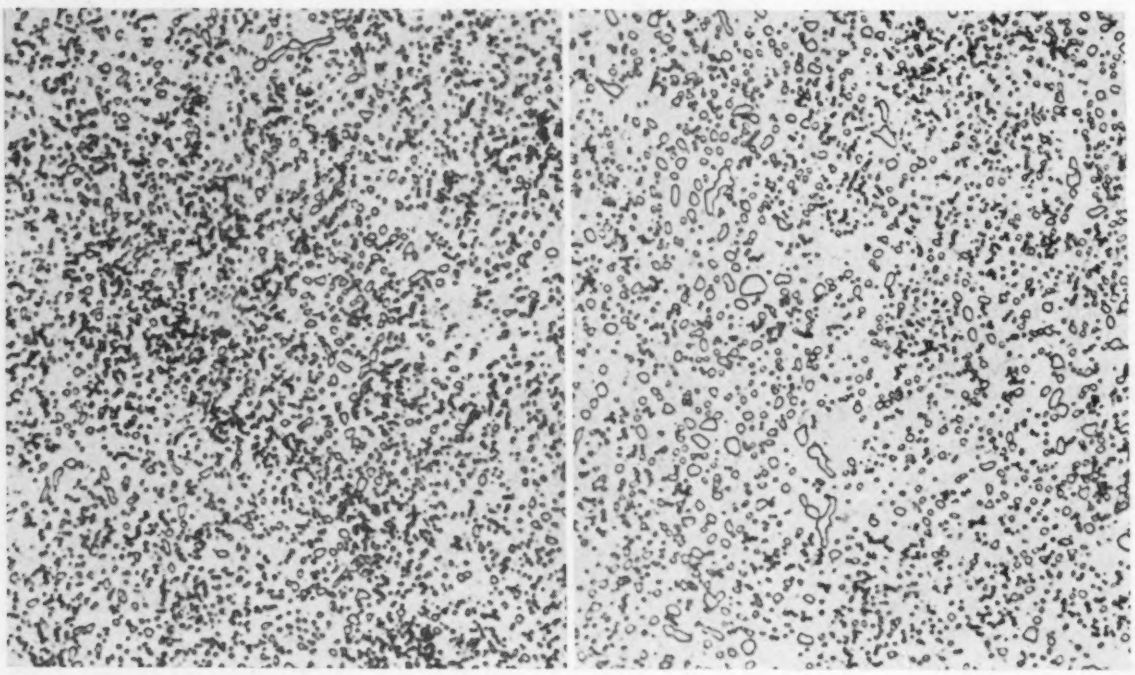


FIG. 47—Effect of austenitizing temperature on microstructure of annealed 0.82 carbon plain carbon tool steel. All samples were completely transformed at 1340 deg. F. The sample shown in photomicrograph 47a was austenitized at 1385 deg., that in 47b at 1450 deg., that in 47c at 1600 deg., and that in 47d at 1750 deg. Etched in picral; magnification 1000 diameters.

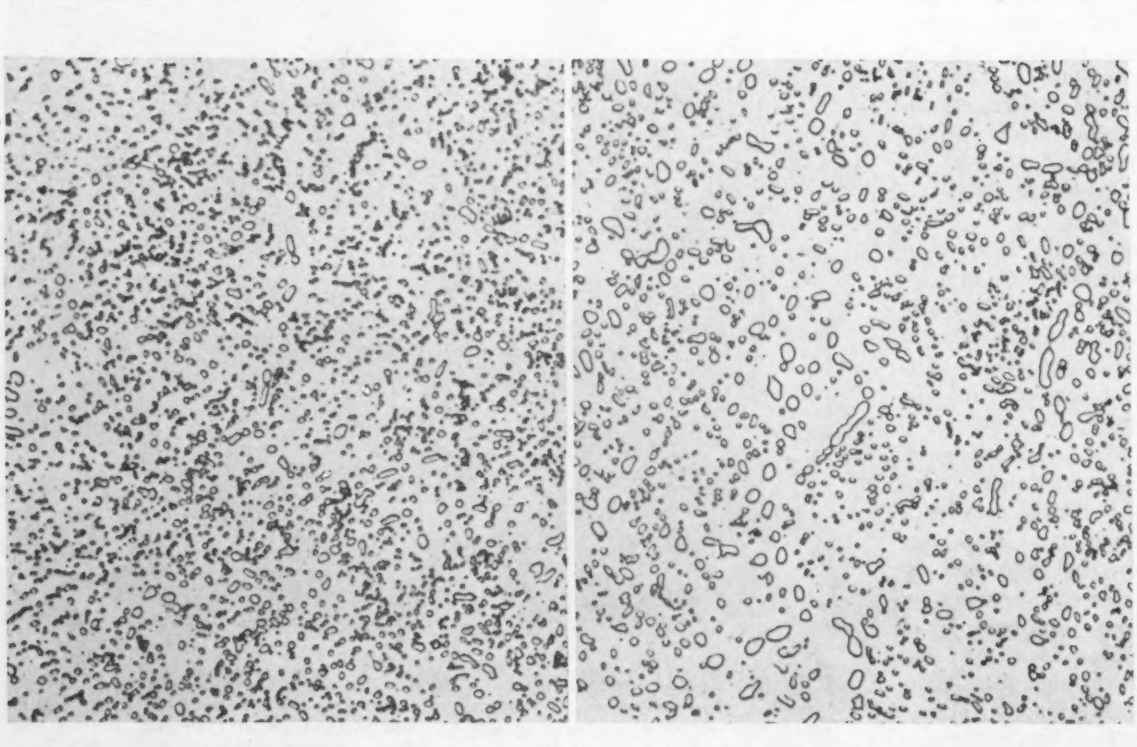
degree, say 10 to 15 hr., at a high temperature at which a spheroidal product is formed, and then to air cool it to room temperature. During this air cool, the residual austenite transforms to fairly hard intermediate products or to martensite. The steel is then reheated to a high subcritical temperature and held for 10 to 15 hr. to temper the hard products formed during the air cool. The tempered structure will consist of spheroidal carbides in ferrite, but the spheroids will be much finer than those formed during the high temperature transformation, and the final structure of the annealed steel will therefore consist of a mixture of coarse and fine spheroidal carbides in ferrite.

Annealing of Forgings

It is possible in many steels to develop a suitable structure for machining by transferring forgings directly from the forging operation to a furnace running at a suitable transformation temperature, and holding them at this temperature for a time sufficient to permit all the austenite to transform, and then cooling them in air. In this kind of operation the effective austenitizing temperature is the "finishing temperature" of the forging and not the heating temperature. If the shape of the forging is simple, a fairly uniform structure throughout may be expected. If the forging is such that some parts will finish much colder than others, then



48a 48b



48c 48d

FIG. 48—Effect of variable preheating and austenitizing conditions on size and distribution of residual carbides in austenite (martensite as quenched) of chromium bearing steels. The sample shown in micrograph 48a was austenitized for four hr. at 1410 deg. F. that in Fig. 48b was austenitized at the same temperature for 33 hr. The sample shown in 48c was preheated at 1380 deg. for four hr. and then austenitized at 1410 deg. for four hr. The sample shown in 48d was preheated at 1380 deg. for 29 hr. and then austenized at 1410 deg. F. four hr. Etched in picral; magnification 1200 dia.

the structure may not be uniform, since, as has been stated previously, the transformation products depend on the austenitizing temperature used. Obviously, a spheroidal structure is not to be expected from such a procedure except in the high alloy steels containing large amounts of carbide forming elements. However, when a lamellar structure is suitable for the subsequent machining operations, the direct transformation of forgings can be a feasible economical handling of steel. A review of the TTT curves will show that a large number of steels could be treated in this manner.

It is to be expected that steels treated this way, especially the higher carbon steels, will be harder than steels annealed by the usual procedures because of the higher effective austenitizing temperatures. For this reason, the direct transformation treatment of the steel as it comes from the hot forming operation is sometimes used as a preliminary step to the usual annealing cycle. This is particularly useful for deep hardening steels which are susceptible to cracking if they are cooled in air after the forging or rolling operation.

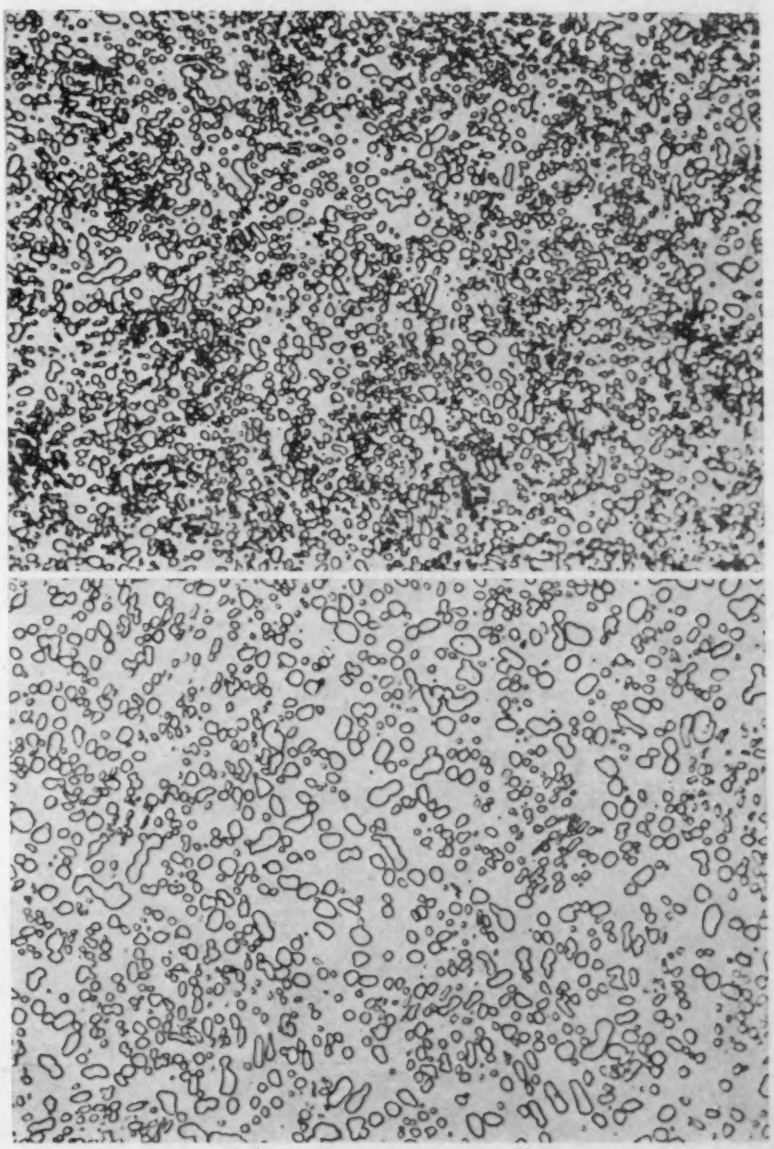
Annealing of Large Loads

The author has tried to make it clear that annealing can be made most efficient when the transformation behaviors of steels are understood, and when this knowledge is applied in every annealing operation. The basic principles are relatively few, and they can be demonstrated readily in the laboratory. However, the conversion of laboratory practice to production annealing may not always be easy, especially when large furnaces are used. The main difficulty is attributable to the facts that the temperature of the steel may vary considerably throughout the charge and that indicated furnace temperatures are not the temperatures of the steel being annealed. This difficulty can be overcome by diligent study of the actual temperatures which exist in a charge, by means of thermocouples placed in contact with the steel in several positions in the load. When the maximum deviations of temperature throughout the load are known, reasonably efficient annealing cycles may be established.

Another source of difficulty may be the fact that all heats of a grade do not have exactly the same TTT characteristics. A cycle which is based on only one heat of a grade may therefore not always give satisfactory results. Because of this, it is desirable to incorporate a reasonable safety factor in the cycle—usually extra holding time at the selected transformation temperature—until a number of heats of a grade have been studied.

It is not possible to specify an annealing procedure which will be most efficient for a particular grade of steel, since the size of bars or forgings being handled and equipment for handling the steel may vary from plant to plant. However, each operating department, knowing the limitations of the furnace equipment available, may set up most efficient cycles for this equipment if the following data are supplied: (1) The lower and upper limits for *austenitizing*, that is, both temperature and time, for the production of a satisfactory structure and hardness in the annealed steel; (2) The upper and lower limits for *transformation*, that is, both temperature and time, for the production of a satisfactory structure and hardness in the annealed steel.

These data may be established easily in the laboratory, by the methods already discussed, and will serve to indicate the ideal annealing procedure. With these data, the furnace



49a

49b

FIG. 49—Effect of preheating in annealing of chromium bearing steel. The sample shown in photomicrograph 49a was austenitized at 1420 deg. for 7 hr., transformed by holding for 3 hr. at 1350 deg. and 1 hr. at 1300 deg., and air cooled. Brinell hardness is 197. The sample shown in 49b was preheated at 1380 deg. for 36 hr., austenitized at 1410 deg. for 6 hr., transformed and cooled like the first sample. Brinell hardness is 179. Etched in picral; magnification 1000 diameters.

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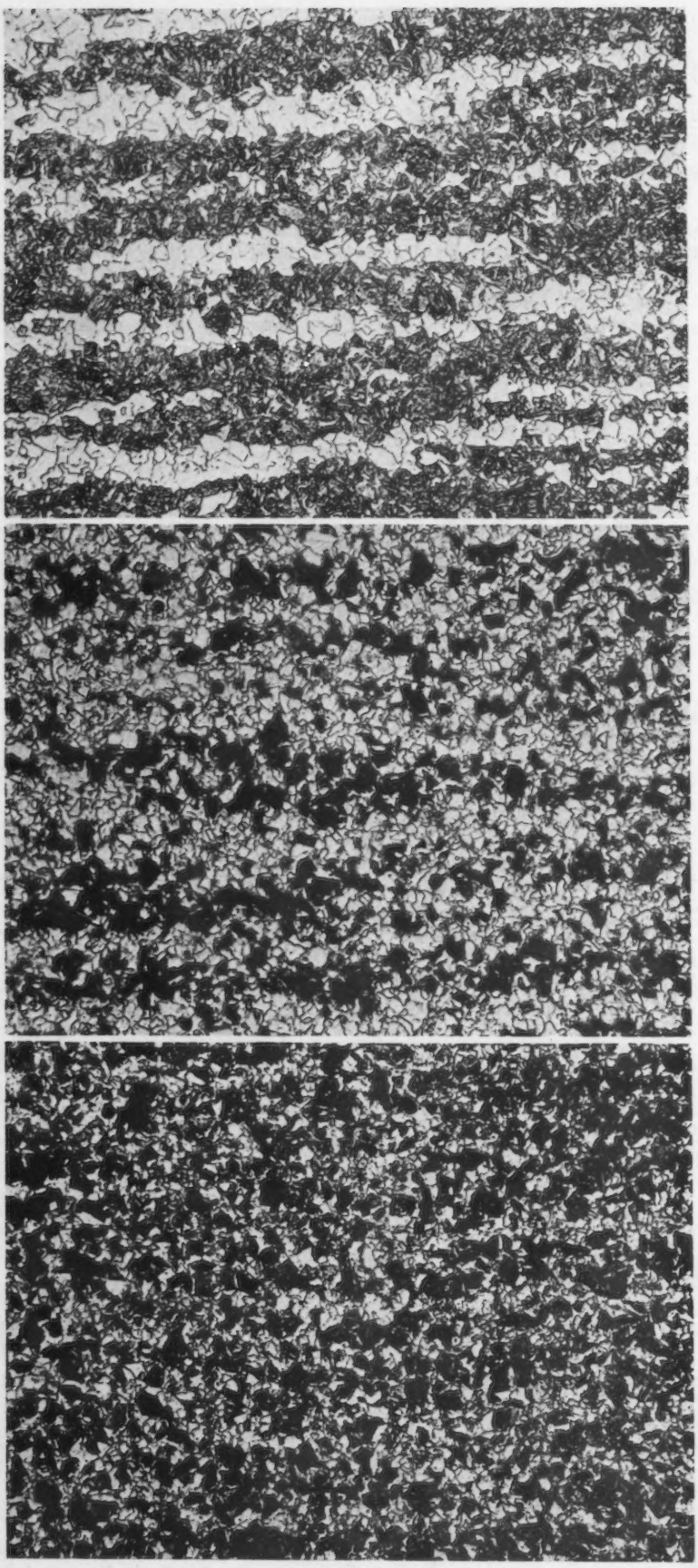

50a

50b

50c

FIG. 50—Effect of transformation temperature on distribution of ferrite in 3312 steel; ⅝ in. sq. bars, austenitized at 1650 deg. F. The sample shown in microphotograph 50a was transformed at 1200 deg., that in 50b at 1150 deg., and that in 50c at 1100 deg. Etched in nital; magnification 200 diameters.

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operator has an oppportunity to judge under what loading conditions with the steel and equipment at hand he can best approach this ideal procedure. For example, with steel of large section, or small sized bars loaded in boxes, a slow heating to the maximum austenitizing temperature would be necessary even though the ideal procedure indicated a rapid heating to the austenitizing temperature, and a short holding at this temperature. However, if small forgings were being annealed and a continuous furnace were available, the practical procedure could be very close to the ideal. On the other hand, if the steel required a long time for transformation, say 8 to 12 hr., within a rather narrow limit of temperatures, the practical procedure could approach the ideal most efficiently if large loads were used and transformation were permitted to take place during continuous cooling at a rate of 10 to 20 deg. F. an hr.

Summary

It has been the purpose of this article to point out that steels can be annealed most efficiently if the operations are made to conform to a few relatively simple rules which pertain to the heating of the steel to form austenite, and to the subsequent cooling of the steel to permit this austenite to transform. These rules are:

(1) The higher the austenitizing temperature, the greater is the tendency for the structure of the annealed steel to be lamellar, whereas, the closer the austenitizing temperature is to the critical temperature, the greater is the tendency for the structure of the annealed steel to be spheroidal.

(2) To develop the softest condition in steel, austenitize at a temperature usually less than 100 deg. F. over the critical temperature and transform at a temperature usually less than 100 deg. below the critical.

(3) Since the time for complete transformation at temperatures less than 100 deg. below the critical may be very long, allow most of the transformation to take place at the higher temperature, where a soft product is formed, and finish the transformation at a lower temperature where the time for the completion of transformation is short.

(4) After the steel has been austenitized cool it as rapidly as is feasible to the transformation temperature to decrease the total time of the annealing operation.

(5) After the steel has been com-

TABLE II

Effect of Austenitizing Time on Hardness of Annealed Chromium

All samples after being austenitized at 1420 deg. F. were transformed as follows: 1350 deg., 3 hr.; 1300 deg., 1 hr.; air cool.

Austenitizing Time, Hr.	Brinell Hardness		
	Heat A	Heat B	Heat C
2	197 to 201	217 to 229	192 to 197
6	192 to 197	212 to 217	192
16	187 to 192	201 to 207	187 to 192
40	183 to 187	197 to 201	179 to 183

pletely transformed at a temperature which produces the desired microstructure and hardness, cool the steel to room temperature as rapidly as is feasible to decrease the total time of the annealing operation.

(6) To assure a minimum of lamellar pearlite in the structure of annealed 0.70 to 0.90 carbon tool steel and other low alloy, medium carbon steels, preheat the steel for several hours at a temperature about 50 deg. F. below the critical before the steel is austenitized, then austenitize and transform as usual.

(7) To obtain minimum hardness in annealed hypereutectoid alloy tool steels, heat the steel for a long time, about 10 to 15 hr., at the austenitizing temperature and transform as usual.

The time required for annealing can be divided into two parts, namely, metallurgical and heat transfer. The time required for the metallurgical changes depends on the composition of the steel and on the hardness and microstructure required in the annealed steel. This can be established fairly simply in the laboratory by a study of the austenite formation and transformation characteristics of the steel. On the other hand, the heat transfer time depends not on the characteristics of the steel, but on the size of the pieces being handled, on the manner of loading the steel in the furnaces, and on the type of furnace being used.

There are some instances in the commercial annealing of steel in which the total time required for the annealing operation is controlled by heat transfer factors. But in a large number of cases, a proper understanding of the metallurgical factors may result in appreciable savings in the cost of annealing steel, in comparison with established practices. These factors include the limiting temperatures for austenitizing, and the limiting temperatures for transformation. Considerable data on these limits have been presented for a wide variety of steels, and methods have been suggested for the determination of these limits in other steels.

The annealing of steel may be carried out most efficiently in some cases by allowing the steel to cool at a fairly constant slow rate to a relatively low temperature. But there are many cases in which steel can be annealed to a thoroughly satisfactory hardness and microstructure with a minimum amount of slow cooling. In these instances, annealing operations can be completed in relatively short times, and can be carried out in continuous furnaces.

The steels which lend themselves to short time annealing operations are

TABLE III

Effect of Austenitizing Time on Hardness of Annealed Crucible Double Special

All samples after being austenitized at 1600 deg. F. were transformed as follows: 1320 deg. for 4 hr.; 1300 deg. for 2 hr.; air cool.

Austenitizing Time, Hr.	Brinell Hardness	
	Heat A	Heat B
2	241	248
4	235	241
8	229	235
16	229	217

those which transform in a short time to relatively soft mixtures of ferrite and carbide. The transformation temperature time curves of steels are the best indicators of this behavior and for this reason a large portion of this article has been devoted to the construction and use of these transformation temperature time, or TTT, curves.

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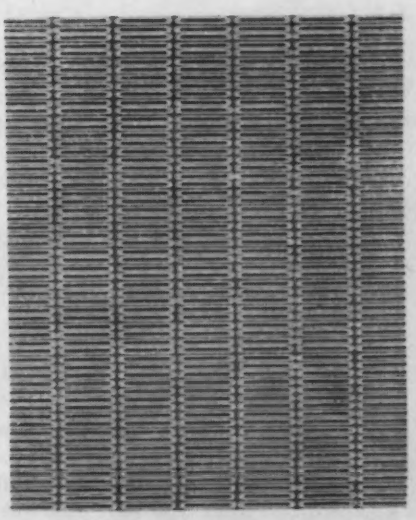
Plastic Battery Retainer

A PLASTIC storage battery retainer manufactured from polystyrene, for use in certain types of Exide batteries, is more permanent than former types and uses less critical material, according to the Electric Storage Battery Co., Philadelphia. Retainers are a part of the separation or insulation between the positive and negative plates, and act principally to retain the active material in the positive plates.

Development work on a new retainer was started before the outbreak of the war. Extensive field tests were undertaken and Exide was virtually ready to put the new plastic retainer on the market when the synthetic rubber program began to demand the raw material from which it was to have been made.

In spite of what seemed a hopeless task with so many plastics being rapidly put on the critical list, the Exide research laboratories again went to work on the problem, and the result is the new polystyrene slotted retainer. Although the basic raw materials are still on the critical list, the polystyrene retainer can be manufactured from secondary materials, by-products from the use of this material for other war purposes.

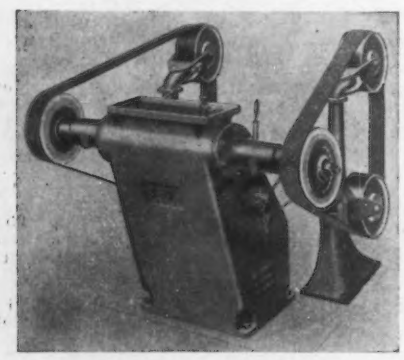


New Equipment . . .

Finishing

. . . Here are described some of the newer developments in backstand idlers for polishing belts, polishing lathes, metal cleaning machines and accessories, and plating equipment.

A FLOOR-TYPE backstand idler, Model 120, introduced by the *Jones Engineering Co.*, Elwood City, Pa., can be connected to any regular grinding or polishing lathe and takes a minimum of floor space, due to a vertical arrangement of pulleys. The conveniently located controls are at the front of the machine for adjustable spring belt tightening and positive screw belt alining. The backstand is said to be able to take any factory-coated belt up to 6 in. wide,

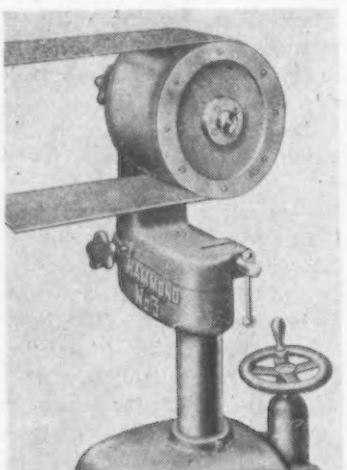


is designed for belt speeds up to 10,000 surface ft. per min. and is so built that simple dust collecting hoods can easily be installed.

Backstand Idler

ANOTHER type of idler stand is offered by *Mattison Machine Works*, Rockford, Ill., which is placed at the rear of the lathe, permitting the use of an abrasive belt running over a contact roll or wheel and traveling back around the idler pulley. Ball bearing idler pulley is mounted on yoke, which can be swiveled by adjustable handwheel to aline pulley with belt, with a cam arrangement for changing of belts.

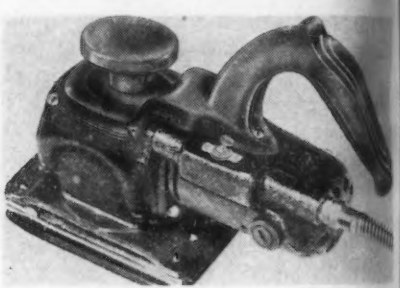
THE No. 3 abrasive belt backstand idler for use in conjunction with surface-coated abrasive belts has been announced by *Hammond Machinery Builders, Inc.*, 1612 Douglas Ave., Kalamazoo, Mich. Surface-coated abrasive belts running over contact wheels are employed on the grinder or polisher in conjunction with the backstand idler, converting existing grinding, polishing and buffing equipment into high production, cost-cutting machines, it is said. The



unit is equipped with a spring-loaded adjusting screw and handwheel, which maintains uniform tension on the belts and releases tension to make belt changes. The ball bearing idler pulleys have a simple adjustment for belt positioning and tracking, and can be used either right or left hand position by turning the idler wheel head and column 180 deg. and locking in position.

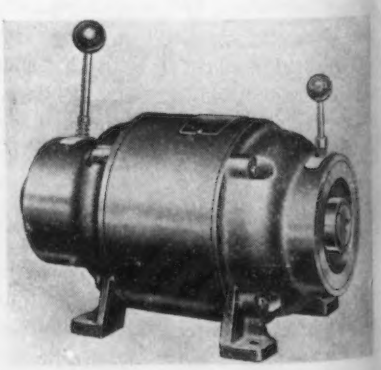
Reciprocating Sander

FOR finishing jobs slow and difficult to do by hand, the *Lintern Corp., Nedco Div.*, 34 Lincoln Ave., Berea, Ohio, is offering the Nedco Model R reciprocating sander, which is said to eliminate the violent vibration ordinarily expected from a speed of 3000 oscillations per min. The unit is supplied ready to plug in any outlet. Equipped with hand grips, the balanced weight and smooth action allow even pressure on the work with only guidance necessary by the worker. The motor is easily removed without distrubing the drive assembly.



Polishing Lathe

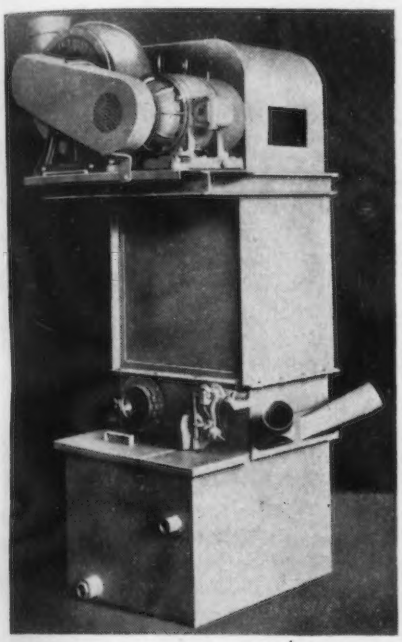
A POLISHING lathe that incorporates a clearance hole through the entire machine is being produced by the *Crozier Machine Tool Co.*, Hawthorne, Cal. It permits polishing a portion of a long piece of work up to the maximum capacity of the lathe. Work can be loaded and unloaded while the spindle is in rotation. Positive opening and closing of the collet is provided through a double-face cam operating mechanism. Adjustments are made by turning the hand grips to tighten or loosen collet tension. A switch and mechanical brake control makes the machine adaptable to work which can be loaded better



when the spindle is stationary. Fourteen models varying in horsepower, capacity, arrangement for collets or chucks, etc., are available.

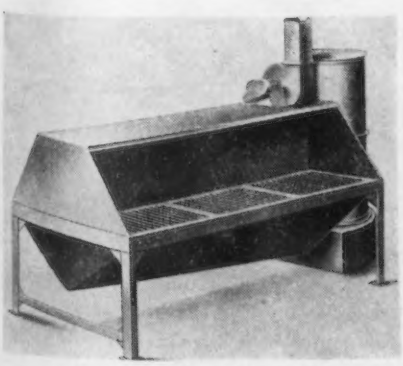
Orifice Type Collector

A SMALL sized unit is being added to the line of orifice-type collectors brought out by the *Industrial Equipment Corp.*, Detroit. Designed especially to meet the requirements of the double spindle grinding and buffing lathes, it has a capacity of 1200 cu. ft. per min. It is said to be particularly effective in work with magnesium. The cleaning action is caused by the scientifically directed movement of air through an orifice. A compartment at the side collects the sludge and permits its easy removal. Water level is controlled by a specially constructed diaphram valve.



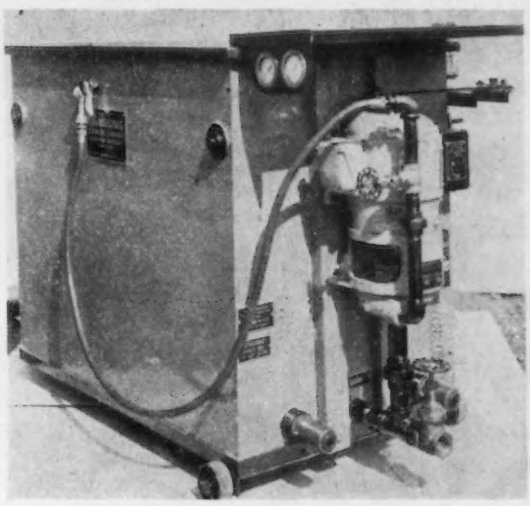
Magnesium Dust Collector

TO eliminate dust hazards in grinding or polishing operations on magnesium, *Claude B. Schneible Co.*, 3953 Lawrence Ave., Chicago, has brought out the multi-wash dust collection system which employs a high flash point mineral oil as the collecting medium. All metallic particles are said to be immediately coated with oil and thus rendered harmless. The heavier particles are submerged in the oil bath and carried away to the settling tank, while the lighter particles are collected in the unit for deposit in the tank. For operations on magnesium castings, the company has developed several types of portable downdraft ventilated benches, which are made with a V-shaped hopper at the bottom which also forms the exhaust duct. Canopies and end sheets guard against side drafts and provide maximum ventilating efficiency with a minimum of air volume.



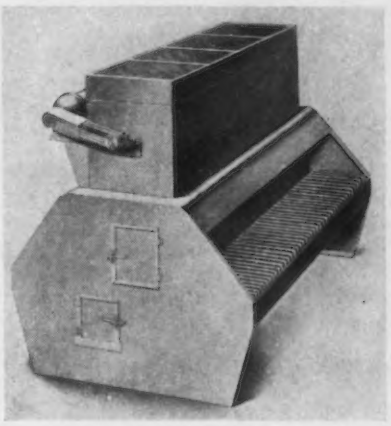
Metal Washing Machine

THE Washing Machine Div. of the *Magnus Chemical Co.*, Garwood, N. J., announces a portable multi-purpose washing machine for cleaning a wide range of large and small metal parts. The parts to be cleaned may be handled by three methods: If small and/or delicate they are handled in baskets; if large, they are handled individually on the lower platform; or they may be hung on racks in the solution. They may be either soaked and agitated in baskets or sprayed with cleaning solution by means of a pump and spray gun. Several types of cleaning solutions may be used.



Small Diameter Buffs

TO fill the need for small diameter, spirally sewed buffs with ¼ in. or reinforced pin hole center, the *Hanson-VanWinkle-Munning Co.*, Matawan, N. J., is equipped to furnish these buffs from 1 in. diameter and up. Sections are 30 ply x ⅛ in. spiral sewing. Any number of sections can be glued together to make up thickness of wheel desired, the company states.

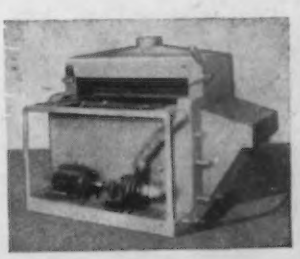


Ventilated Finishing Bench

A MULTI-WASH ventilated work bench offered by the *Claude B. Schneible Co.*, 3953 Lawrence Ave., Chicago, provides for continuous dust removal from hand operations. The space under the grates is closed by a dust hopper, which slopes to a longitudinal center tank. Air is drawn over the work by means of motor-driven fans and dust particles are impelled against a set wall in the back of the bench or the wet panel below the grate and washed downward into the tank below. Dust is also picked up by the indrawn air and carried downward through the grates into the dust chamber, where it is impinged on the wet surfaces. The air is washed by multi-wash collector units before being discharged back into the workroom through a safety filter. Solids are flushed from the collectors and discharged into a settling tank, which also receives the solids that fall on the flushed surface of the hopper. The water, oil or other cleaning medium is circulated by a vertical centrifugal pump.

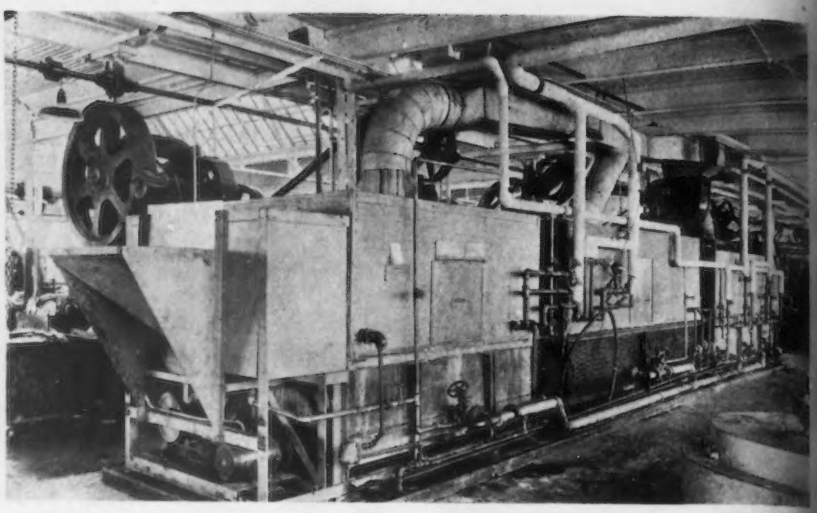
Metal Washing Machines

N. RANSCHOFF, INC., 16 Elmwood Place, Cincinnati, announces a single stage washing ma-



chine for the removal of oil and chips from work such as machined shafts of standard or special shapes during inter-process operations, and for removal of rust-proofing oils before assembly from parts which have been shipped from subcontractors. An outstanding feature of the machine is the special carriage which consists of V-shaped brackets.

The section of the brackets which comes in contact with the work is lined with brass to prevent scratching of the most highly machined surfaces.



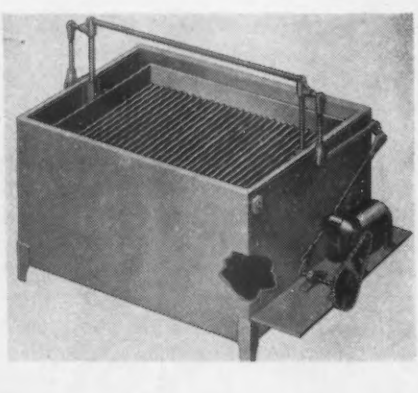
THE Tabl-Spray metal washing machine has been developed by *American Foundry Equipment Co.*, 555 South Byrkit Street, Mishawaka, Ind., for hihg speed washing of flat, fragile work or circular parts with intricate pockets and crevices. Parts to be cleaned are placed on the mesh table and rotated through either an alkali washing solution or a solvent emulsion discharged from special nonclogging nozzles. After a short period, the solution valve is closed and the parts left rotating to obtain proper drainage. Rinsing with fresh water is handled in the same compartment and a compressed air blowoff can follow the cleaning to remove excess liquid. A system of straining devices placed in the path of the recirculated cleaning solution settles out all chips or foreign matter.

Pickling Machine

A CONTINUOUS drum-type pickling machine has been developed for high-speed cleaning of shell cases by the *Howard Engineering & Mfg. Co.*, 1830 Freeman Ave., Cincinnati. It is said the machine is capable of pickling a maximum of 8000 37-mm. shell cases per hr. Parts to be cleaned travel through the machine in a drum which varies in diameter between sections, so that each section of the drum runs in its particular tank. Scale is removed from annealed parts by successive pickling, rinsing, neutralizing and rinsing operations. A variable speed drive provides for necessary changes in the pickling time. No pumps are used, acid, rinse and neutralizing solutions being picked up by scoops on the side of the drum, and dumped by the scoops on the parts. The pickling drums are made of monel metal and the tanks are lead lined. The machine is available in various special sizes.

Metal Parts Washer

THE *Sturdy-Bilt Equipment Corp.*, West Allis (Milwaukee), announces its Simplex metal parts washer in which the solution in an insulated tank provides a chemical swishing action during the soak, loosening grease, oil, dirt and foreign metal chips. The cleaning solution is heated to a temperature of 120 to 130 deg. by means of steam, electricity or gas. An electric motor operates a lever mechanism which raises and lowers the material tray into and out of the soaking tank. The machine is furnished in three sizes, with capacities of 130, 265 or 450 gal. They can be installed in different departments or in a series, one unit for cleaning, another for rinsing or rust prevention coating and others for special requirements.



Cleaning Machine Baskets

A TRIPLE, fine-meshed basket which fits snugly into the regular work basket of its cleaning machine has been devised by *L & R Mfg. Co.*, 54 Clinton Street, Newark, N. J., to clean different types of small parts individually and yet run them through the machine at the same time. It is claimed that because of the centrifugal action of the basket in the cleaning compounds there is no danger, once the contamination has been removed, of the foreign matter returning into the basket and affecting other parts. After the complete cleaning cycle, parts are taken from the work basket dry and ready for assembly. L & R solutions have a flash-point of approximately 115 deg. F.

An air-minded world waits for wings

BECAUSE of the airplane, the peace to come can be as global as the war. Trade and transportation will move freely to peoples never before a part of the world's markets. Millions to whom modern life is unknown have already met and understood the airplane. Like all of us, they will welcome its cargoes.

Such an opportunity can help maintain a war-size aircraft industry. The largest warplanes, the speediest bombers, may be inadequate for coming needs of passengers, mail, air express and freight.

The air industry can plan for an era of conversion and new production with a freedom in one way unknown. Materials will be available in almost endless quantity and variety. Revere alone will be ready with all forms of copper, as well as with gifted new alloys. But which metal should be used for what? The choice may not be easy.

For impartial answers to questions about metals, industry can turn to Revere. For just as industry in the future will not be restricted to the traditional materials, neither will Revere. Since the start of the war, in addition to widening still further the uses for copper and its alloys, Revere has developed facilities for manufacture of the light metals, and is pioneering in the production of wholly new alloys that can cut manufacturing costs for many industries.

Today the copper industry is producing all-out for war. No copper is available for any other use. But post-war planners with specific problems in metals are referred directly to the Revere Executive Offices in New York.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

Executive Offices: 230 Park Ave., New York

Assembly Line . . . STANLEY H. BRAMS

• Surplus war tools, piled up at Detroit, forecast problems at war's end . . . Auto men advise oil officials postwar changes to be slow.

DETROIT—The shape of things to come is at hand. Awaiting disposition into war production channels as soon as may be possible are close to 100,000 surplus and obsoleted tools, nearly all comprising the residue of one contractor working on one major job. There are probably 4000 distinct sizes and shapes. More leftovers from this contract are still flowing in. Probably when inventory of on-hand and incoming equipment is completed, it will be found to represent around $2,000,000 in investment.

There are cemented tip tools and tip blanks, drills, milling cutters, reamers, broaches, gear cutters, all of high speed steel or carbide. There are tool steel rounds, some centered, some only cut into usable sections. About half of this prodigious assortment consists of standard tools, and these will likely be disposed of readily in these times. The remainder are special tools, and there is obviously little immediate market for them.

This equipment is being sold at exactly what the government paid for it. In the cases of the standard tools, the quotations are advantageous. In the cases of the special tools, prices appear generally high, perhaps because many of them were bought in small quantities.

From the warehouse where boxes of these tools are piled up awaiting classification and distribution can be projected a forecast of what will happen when the war finally ends. The present surplus tool stock is far larger than the average factory operator ever sees in one place in his lifetime. And nearly all of it, as has been said, comes from one contractor working on one major job. Perhaps it is not thoroughly typical, but it likely is a rough approximation of the huge leftover stocks which can be expected after many good-sized contract terminations.

Some of this surplus has a history going back to the pre-Pearl Harbor days. At that time there was no great scarcity of cutting tools, but one was clearly on the horizon, and many firms took what then seemed a wise course and stocked up. Some plants say they were urged by military men to build up and maintain a year's supply of cutting tools.

Then production in volume got under way, and the inventory stockpiles were held as firm as possible, even though the national situation on cutting tools edged toward the critical. Contract reductions began to occur; reducing of a contract by 25 per cent meant that a 12-month inventory became a 16-month supply.

Then inventory restrictive measures like CMP began to come into play. Large tool inventories could no longer be maintained, but they could be run down only by the slow passage of time and attendant tool mortality.

Simultaneously, design changes increased. Most changes necessitated retooling, and the former tools thereby became obsolete. And, as has been well publicized, changes in war work come thick and fast.

The end product when such circumstances are combined is a situation as in the Detroit warehouse room where tools are accumulated like insects in victory gardens.

COMMITTEES from Congress may point fingers of blame at such situations, and they will likely do so. Military men and war contractors will be blamed. Some blame likely will be justified. But at the same time, somewhat of a brief can be drawn for the other side, for the operators who had to guesstimate their production way.

Return of these tools to government warehouse appears to indicate that at least in this one case the contractor is not blamed for the startling scope of the obsolescence in his tool pile. As a matter of fact, title in such perishable tools rests with the military purchasers, during purchase, use, and in return as surplus. Transfers made from the government agencies to the contractors are only for purposes of accountability; as soon as a tool wears out it is so marked on the records and dropped from the inventory books.

Other companies also have stockpiles of obsoleted equipment and they are a bit uneasy about it. The desired aim of these contractors seems to be to get the surpluses out of their plants and back into Army hands, as in the one instance at hand. Among other things, this helps to achieve the low inventory position being sought by producers.

None of the surplus warehouse stock at Detroit is going into normal machinery trade channels, as might be expected. The reason is that prices have been set on the merchandise, and the presence of a middleman in the picture would logically increase them. Nevertheless, some feeling, particularly in private industry, is that the best way of moving these goods would be to route them through regularly established channels, rather than setting up an Army tool variety store whose customers will consist entirely of war contractors.

This situation poses some very real worries ahead for tool making companies. They can look around the warehouse and see thousands of pieces accrued as surplus from one contract — finished, semi-finished and blank cutters. Seeing this, it is not hard for them to visualize the effect on their normal markets when the war ends

LOST: 28-Ton Tank

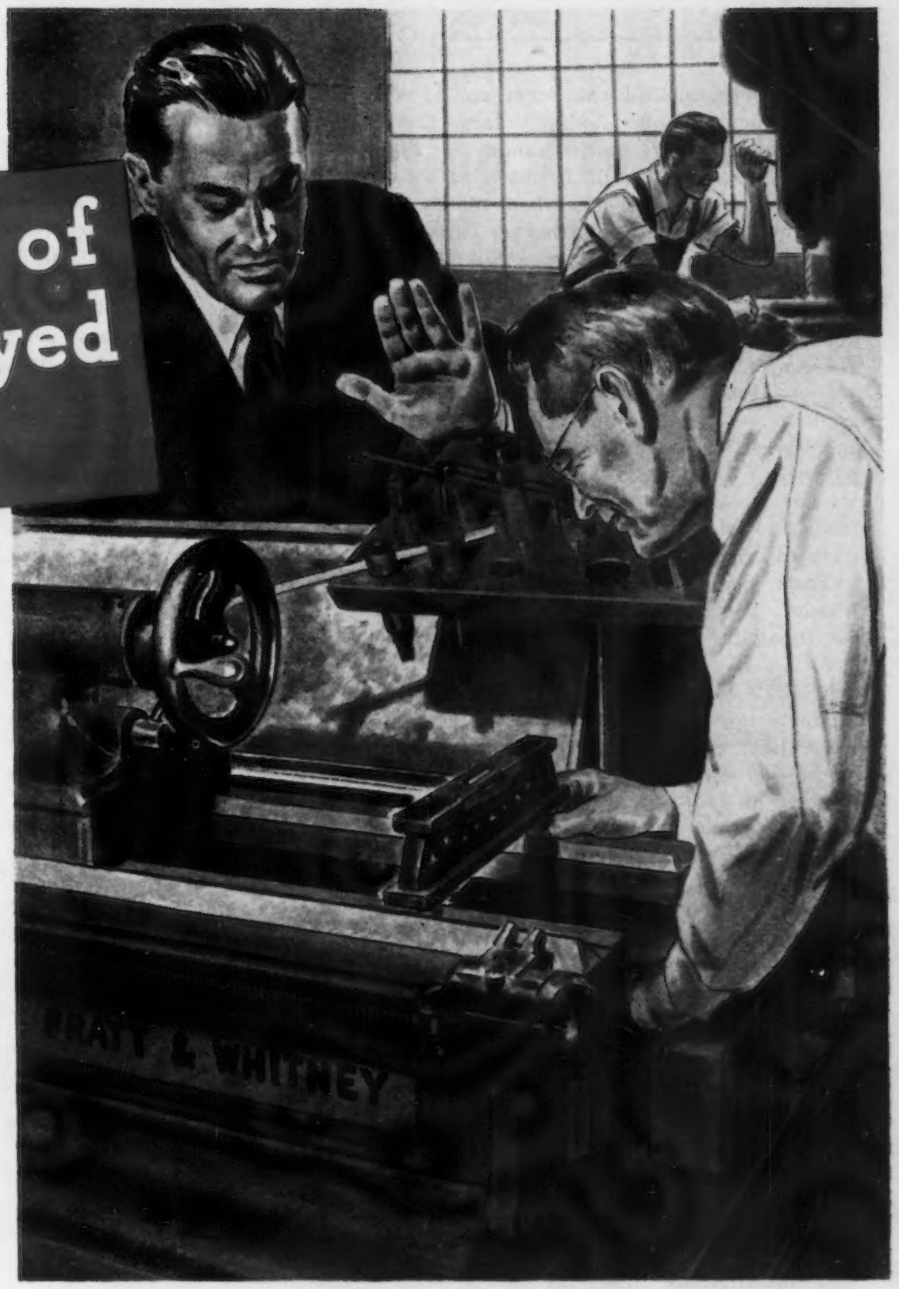
Detroit

• • • Tight official silence is in effect, but a laugh rippled through some automotive plants last week when word filtered around that one tank producer had, on paper at least, lost a medium tank.

The 28-tonner was charged out of the plant to a specified destination, but it never arrived there. Learning that, the tank maker found its records lacking the whereabouts of one fully produced vehicle, and quite a scurry ensued to turn it up. The official denials of the case made it impossible to ascertain whether the tank has yet been found, or whether it still is missing.

AD. 491

The Case of the Cockeyed Lathe



TEN new Pratt & Whitney lathes stood in a neat row—clean lined in their wartime gray. Nine of them were turning out beautiful precision day and night — doing things the Axis won't like. The tenth performed with appalling inaccuracy. It didn't cut straight . . . it cut taper as much as .006″ per foot.

That didn't sound right to us. We have high standards, and we maintain 'em. A P&W field engineer went in to check. He took with him a Pratt & Whitney Precision Level — the kind we use to level our own machines. The answer — nine lathes properly level . . . but the tenth was out of level about .012″, with a wind in the bed.

Under the guidance of the P&W man's precision level they gradually brought the machine back into line. Result: the lathe cut straight over its entire bed length easily within .0004″ per foot . . . a decided improvement! No lemon here . . . just a small razzberry for the man who had installed the machine with a carpenter's level of doubtful accuracy.

* * *

Pratt & Whitney builds fine machine tools of great accuracy, and sees to it that they leave our shop in good condition. While we are building them, the beds and slides and carriages are kept level during all scraping and fitting. If you'll install them accurately level, they'll function with the smooth precision we put there. But if you induce an out-of-level twist, it's no go. Any good machine tool is that way. A carpenter's level* won't do. It pays to recheck the level of your machines often.

And make sure your operator of any Pratt & Whitney machine reads what we say about leveling in the instruction book that was shipped with his machine. It's important.

**Our gage department makes and sells precision levels for just this purpose.*

PRATT & WHITNEY
Division Niles-Bement-Pond Company
West Hartford, Connecticut

PRATT & WHITNEY

MACHINE TOOLS ★ SMALL TOOLS ★ GAGES

WEST HARTFORD CONNECTICUT

Basic Accuracy for Mass Production

and a thousand and one other contract windups move similarly large surpluses into government hands. A tremendous weight will be hanging over tool company heads when that happens, and if the weight is ever cut loose it will drop with crushing force. Quantities of tool blanks and standard tools worth tens of millions of dollars could suffocate normal manufacturing for considerable time. The tool companies, if they are foresighted, will begin to seek steps right now, either to enforce steady reduction of all such overheavy inventories, or to ensure that the post-war surpluses be dribbled into the market, rather than dumped on it.

Tools are not alone in the warehouses. There is food there also—food for thought.

PREDICTIONS on post-war manufacturing have drenched printed pages like red stamps in the grocery at the end of the month. Now, finally, appears an indisputable sign, insofar as the passenger car industry is concerned.

Talk of light, aircraft-type engines burning high octane fuels began to boil so hard some time ago that oil company representatives knocked on Detroit's door and inquired politely but firmly what was cooking. After all, they pointed out, new type engines would be useless without proper fuels to operate them, and a sufficiency of fuel was impossible unless notices were posted in time by the auto makers. For there are around a dozen distinct fuel types in the high octane ratings, and standardization of a sort would be imperative to achieve most effective automobile performance.

The auto manufacturers were quite willing to sit down with the oil people, and a meeting was arranged. It was held in the strictest privacy some weeks back. Neither side had anything to gain by deceiving the other; in fact, either side had plenty to lose. So the cards were laid on the table.

These were the salient facts of the meeting:

The auto people have not undertaken the redesigning which would have to precede development of 100-octane gasoline motors.

The oil people feel, therefore, that post-war automotive engines will be satisfied, from standards of quality and quantity, by pre-war octane ratings of standard fuels and by modest increases in the ratings of premium fuels.

The meetings between the oil and automotive executives began with a statement of policy from the car makers, that conversion will be speeded to the utmost as soon as the war ends to relieve unemployment, and that the best means of so doing will be to resume output of quasi-1942 models. Unspoken, but obvious in this stand, is the fact that the first companies to have cars in the field will have considerable advantage over the others in signing up new dealers—a definitely more practical reason than the socially-minded one stated.

These first post-war models, ran the policy, would substantially resemble the last models to be produced. Thereafter design changes would be developed in a normal course of events but change would be "evolutionary and not revolutionary."

THE oil people were primarily interested in the reports of new lighter engines of aircraft type which would require fuel of 100 or similarly high octane rating. On this score the auto makers reported that they have been unable, due to war stresses, to undertake the redesign and testing required for development of high premium fuel powerplants for automobiles.

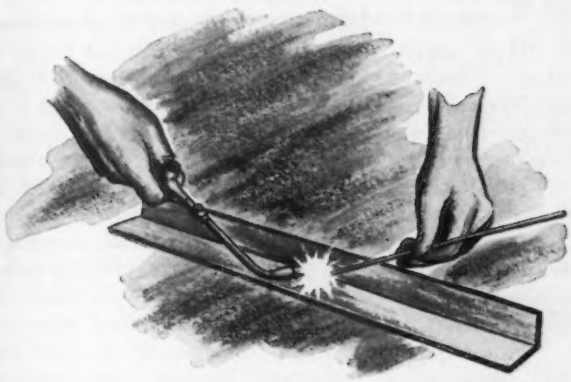
In fact, some doubt was expressed by the auto men as to whether such types of motors would ever be practicable for automobiles. Their higher initial cost, their need for more maintenance and their comparatively rougher operation were points brought up to support this viewpoint. At any rate cars which burn 100-octane fuel and get 50 miles per gallon doing it will be sought in vain by motorists in the immediate post-war period and for many years afterward.

Notwithstanding this, the brass hat-tery of the oil industry present at the Detroit meeting made no bones about declaring that better gasoline would be available as needed, if not in too large quantities at one time. War-time refinery expansions will probably make it possible for them to be a step ahead of the automotive engineers in development of higher quality power plants.

In this connection a pertinent point should be offered. Oil people are genuinely disturbed about the apparent shrinking of our national reserves. Production from new wells during the past few years does not appear to be meeting normal (not war-swollen) requirements for continued and unrestricted gasoline use. Some of the gloomier of these analysts believe gasoline rationing may be here to stay and it must be said that they can produce supporting evidence. Conceivably the automotive engineer of the long term ahead, 50 years from now, will not be worrying about high octane gasoline motors, but will be concerned instead with steam cars, or with converters for utilizing power locked in coal or other such material, or even—to be extreme but not entirely fanciful—with capsules of controlled atomic power.

BUILDING RADAR SETS: At one of General Electric's plants radar equipment is assembled and built into sets for U. S. Navy ship and shore installations. Radar is an electronic device sending out radio waves which are reflected back to sensitive receivers when a ship or plane enters the area that the waves cover.

et Us Help You Tackle Tough Stainless Fabricating Problems!



Along with providing useful technical data for designers and engineers, Carpenter's service organization is helping to do trouble-shooting jobs along many production lines where Stainless Steel is used. For example, in one plant, daily production of Stainless parts was greatly increased (and scrap loss reduced 30%)—through a Carpenter representative's suggestion.

If you are running up against tough Stainless fabricating problems, get in touch with your nearby Carpenter representative. He can give you real help in the plant, and can keep your engineers in close touch with our Metallurgical Department.

Machined to hairline tolerances,

thermometer wells like this are produced faster, because of the free-machining properties Carpenter gave to Stainless Steel. And from the designer's standpoint, this Stainless is ideal for licking tough heat and corrosion problems.

Sharp bends and intricate shapes

present fewer problems where soft, ductile Carpenter Stainless Strip is used. This Stainless Strip is ideal for making products ranging from recorder pens like this to oil field equipment that "takes a beating" every day of the year.

Fabricating Hints and Engineering Information . . .

This 98-page working data book is offered free to users of Stainless Steel in the U. S. A. For your copy, drop us a note on your company letterhead. Between the covers of "Working Data for Carpenter Stainless Steels" you will find useful hints on:

Machining
Forming
Blanking
Welding
Riveting
Forging, etc.

. . . as well as over 40 pages of important facts and tables giving the physical and working properties, analyses, etc. of the various types of Stainless Steel. Ask for your copy today.

Carpenter STAINLESS STEELS

BRANCHES AT Chicago, Cleveland, Detroit, Hartford, St. Louis, Indianapolis, New York, Philadelphia

The Carpenter Steel Company
121 Bern Street, Reading, Pa.

Washington . . .

L. W. MOFFETT

• Renegotiation Act will remain intact . . . Large corporations prove to Naval Affairs Committee necessity of bill allowing reasonable post-war reserves out of profits . . . Congress expected to act on this.

WASHINGTON — The Renegotiation Act passed last April is not going to be repealed, but industry is going to get a break in several ways. It is likely that Congress will pass a bill to allow reasonable post-war reserves out of profits.

Also a number of congressmen have said that comparative figures should be given to show the financial position of other members of an industry so that a contractor will know that the Price Adjustment Boards are giving his company fair treatment. Legislation will be enacted to accomplish this end, and will probably include a prohibition against the revealing of company names.

Other industry requests that the government devise a formula to determine what prices should be sliced or profits slimmed and for renegotiation after taxes. These requests are definitely not on the list of probable legislation. Likewise, the exemption of standard items from renegotiation on the ground that since it is a standard commercial article prices are fair will not pass into law.

The foregoing are the principal proposals of both big and little industry made to the Naval Affairs Committee in three weeks of hearings held just before Congress went home. Other proposals ranged from the allowance of the amortization of war financed facilities, to charges for storage of peacetime industrial machinery, from installment payment of renegotiated profits, to the repeal of the law.

THE Committee should be complimented on its attitude of decency and politeness in the treatment of industrialists, an agreeable departure from the practice of some committees during the decade of anti-business tirades. Members of the committee showed intelligent interest in the financial matters presented to them, which included the worries of subcontractors with the minimum amount of war business subject to the law, to corporations whose war income was several hundred millions.

As a result, committee members received the fullest cooperation from industrialists and now have hundreds of pages of testimony upon which to base legislative action.

Congressmen have said that they are in favor of allowing post-reserves but the Secretary of War, the Secretary of the Navy and the Chairman of WPB, have declared themselves against it.

A joint statement of the secretaries of March 30 reads as follows:

"Costs of post-war conversion—Contractors frequently create reserves for the purpose of reconverting their plant facilities to normal peacetime operations at the termination of the war.

"It is the policy of the departments to disallow any such charges for the reasons that (1) the necessity for the reconversion may never arise; (2) the nature, extent and cost of reconversion is too conjectural to warrant a present determination with respect thereto, and (3) the unknown duration of the war precludes an estimate with any degree of accuracy of the amount of money which may be required for reconversion."

WPB Chairman Donald M. Nelson's letter to the secretaries and concurred in by them reads as follows:

"This is in further reply to your letter of Feb. 10, 1942. Your letter raises the question whether the government, in connection with conversion of industry plants to war production should bear the costs of storage of removed facilities and of restoration of plants to a condition suitable for normal peacetime production at the end of the emergency. Your letter also raises certain problems which should be decided if the government adopts the policy of bearing such costs.

"Careful consideration has been given to this problem and representatives of several agencies interested in this problem have been informally consulted. I have come to the conclusion that under present circumstances, the government should not undertake to bear such costs, either directly or indirectly and every attempt should be made to avoid burdening the government with these costs, indirectly through inclusion in prices. Such attempts may not be universally successful; but as a general rule, I am of the opinion that procurement officials should not knowingly permit the inclusion as an item to be covered by price, of part or all of the costs of storage or reconversion. These costs should be borne by the contractor and should be charged, not against war production, but against production for peacetime consumption."

Whatever motivated Mr. Nelson and Messrs. Knox and Stimson, it could not be that they did not realize that as Representative Melvin J. Maas, Republican of Minnesota, put it "you made it easy for everybody to get into the war business, but you are making it impossible for them to get out." Possibly, it could be that though the renegotiation law does not prohibit the inclusion of reserves for post-war reconversion, these gentlemen were over-cautious—afraid of what public opinion would be of an open aid to industry. On the other hand, they may have felt that such action was in the province of Congress.

Undersecretary of War Patterson showed what he thought when he asked Representative Maas, "Do you want an insurance policy against the loss for the life of your company? Because if you do we can't give it, and nobody else can."

Undersecretary of Navy Forrestal said that he was against the allowance of post-war reserves because the problem is too broad to be solved through renegotiation, since post-war conversion involves industries which have been closed down by the war and thousands of other concerns beyond the scope of renegotiation would not be benefited if the renegotiation law were amended to this effect.

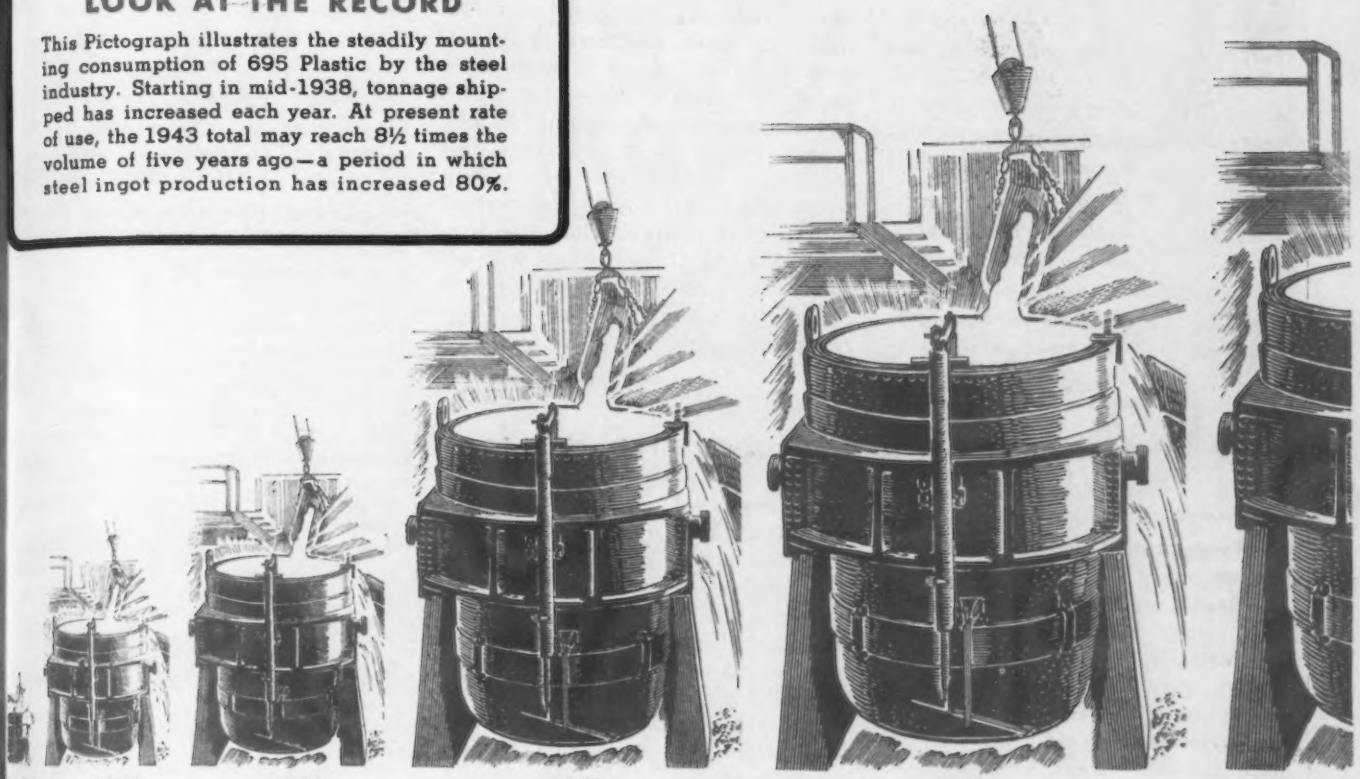
THE big companies such as Westinghouse Electric Mfg. Co., General Motors Corp., Newport News Ship & Drydock and the Aluminum Co. of America have shown that they must have reserves. Some of these companies have said that they can provide for themselves after the war out of capital and profits allowed. Others have declared that profits after renegotiation and taxes will not be sufficient to adequately permit them to retool and rearrange their plans and designs for peacetime production.

But the aircraft companies have shown that because of their unfavorable tax base and extreme expansion they stand to lose their businesses after the war if there is the slightest mischance, much less have enough capital to pay for the design and construction of civilian use airliners.

Francis A. Gallery, vice-president of Consolidated-Vultee Aircraft Co., minced no words in telling the com-

LOOK AT THE RECORD

This Pictograph illustrates the steadily mounting consumption of 695 Plastic by the steel industry. Starting in mid-1938, tonnage shipped has increased each year. At present rate of use, the 1943 total may reach 8½ times the volume of five years ago—a period in which steel ingot production has increased 80%.



1938 (PART) 1939 1940 1941 1942 1943 (3 MO.)

695 -the ACCEPTED plastic refractory

Since its introduction to the steel industry in 1939, the use of 695 Plastic has doubled, redoubled, and then doubled again. The reasons for this ever-growing acceptance are self-evident.

695 is a convenient, ready-to-use refractory. It is most popular as a tap-hole mixture, because it so greatly lengthens tap-hole life. Many open hearth men find that a 695 tap hole lasts double the number of heats obtained with ordinary chrome ore or homemade mixes.

695 is just as suitable for dozens of other hot applications in both open hearth and electric furnaces. It is easy to apply, sets quickly and stays in place. It has a melting point well above 3600°F.

No wonder 695 is in regular use in more than 70 steel plants. If you are not yet using it, you may be missing a chance to reduce tap-hole and other delays. Get in a few bags of this dependable, plastic, high-magnesia refractory and try it.

BASIC REFRACTORIES, INCORPORATED

CLEVELAND, OHIO

mittee what would happen to the aircraft industry after the war if good reserves are not permitted to be retained. Mr. Gallery spoke for such West Coast airplane manufacturers as Douglas, North American, Lockheed and Ryan Northrup.

Mr. Gallery declared, for instance, that Consolidated has a working capital of only $9,000,000 against which there are liabilities of $540,000,000. If Consolidated's contracts were terminated overnight (as they might be under the law), the working capital would only be enough to meet their payroll for about two weeks. Entirely new designs and tooling for 100 passenger aircraft for peacetime use would cost $14,000,000. Mr. Gallery would like to exempt 10 per cent of profits from renegotiation and predicts that the United States will become a third or fourth rate air power among the nations if Congress does not provide the reserves.

o o o

New Warehouse Rules Issued in Reg. 4

Washington

• • • **Substantial changes** have been effected in regard to steel and copper warehouses and distributors in a general revision and re-writing of CMP Regulation No. 4. Major changes concerning steel warehouses permit a warehouse to reject steel orders by customers which do not call for immediate delivery, except authorized orders, orders by farmers under PR 19 and orders bearing ratings of AAA. The main purpose of this change is to protect small warehouses which operate largely from stock.

Small orders for carbon steel, enumerated in the table in that section concerning steel, may be filled without authorization up to 10 tons of carbon steel and 2 tons of alloy steel. The table of permitted unauthorized deliveries has been revised. Specific classifications of steel products are grouped in a catch-all class now known as "All other steel products" and the classifications which are unchanged as to title have been reduced in permitted quantities.

The purpose of the revision of the steel warehouse section of the order was to bring the regulation into conformity with PR 19, concerning farmers. In addition, since the issuance of the regulation in February, MRO uses have been expanded with the result that provision for certain users is no longer required in this order.

The copper phase of the regulation is not changed in so many specific ways as the steel section. In general the copper section is reworded and specific definitions are issued covering "items of brass mill products and wire mill products."

After Sept. 30, deliveries of brass or wire mill products are banned with the exception of authorized controlled material orders. Until that time under section F (i) brass and wire mills may ship up to but not more than 2 per cent of the total quantity of each class of product shipped by the warehouse during the period from April 1 to June 30, 1943. This permission covers the period from July 1 to Sept. 30, 1943.

Previous prohibition against acceptance of orders from brass or wire mills which aggregated more than 2000 lb. of copper in any one calendar month has been eased slightly. Under the amended CMP 4 that ban applies at the rate of 3000 lb. per month. According to CMP officials it was found that a greater degree of latitude was required for a small number of consumers.

In regard to aluminum, deliveries are prohibited except to fill controlled materials orders or at specific direction of WPB.

•

Sales of Steel Drums Strictly Controlled by WPB

Washington

• • • **Sales of rejected** new steel drums and seconds were placed under control of WPB by an amendment to General Preference Order M-255, the Containers Division of the WPB announced last week.

The order provides that after July 17, no manufacturer of steel drums shall sell or deliver to anyone except the Army, Navy, Maritime Commission or War Shipping Administration, any rejects or seconds in excess of three-quarters of one per cent of his monthly production without express authorization of the WPB. Rejected drums totaling less than the restricting percentage, may, however, be sold without authorization but only for an amount less than the unit price of the order or contract under which they were manufactured and not in excess of any applicable maximum price regulation. Where a sale of rejects or seconds in excess of the restricting percentage is made to a user, it is necessary for the user to file Form PD-835; where the sale is made to a reconditioner, the manufacturer simply applies to the WPB Containers Division by letter for the authorization to sell.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

Backed Up BY GAGES BACK HOME

The attacking enemy with bayonets fixed suddenly lunges out of the jungle and charges our position. Our machine gun roars into action with deadly precision. The attackers are wiped out to the man—our casualties, none.

But if that gun had jammed because perhaps of just *one* oversized cartridge! . . . Just one faulty cartridge, not accurately gaged at the factory, might have resulted in our entire machine gun squad being killed there in the jungle for we were badly outnumbered. In that case, a valuable military position might have been lost.

The only sure way to prevent such a tragedy is to completely check every cartridge with precision gages. Where life and death hang in the balance, there is no alternative to 100% inspection with accurate gages for all American ammunition.

★ ★ ★

Sheffield specialists in Dimensional Control developed revolutionary precision instruments for the simultaneous checking of all critical dimensions of ammunition ranging in size from 30-caliber to 5-inch shells.

★ ★ ★

SHEFFIELD
MASTER GAGEMAKERS

THE SHEFFIELD CORPORATION

Dayton, Ohio, U.S.A.

AUTHORITIES IN DIMENSIONAL CONTROL

WEST COAST. . . .

OSGOOD MURDOCK

• June marks five-year high in establishment of new plants at Los Angeles . . . Concern over cross-hauling brings renewed pressure for Coast aluminum, steel facilities . . . Ickes cuts knot on metallurgical laboratory.

LOS ANGELES—Those who take heart in reports that the boys will be out of the fox holes by Christmas and who feel that the peak of wartime industrial expansion has been reached will be set back on their heels by statistics emanating last week from that indefatigable civic body, the Los Angeles Chamber of Commerce.

The chamber states that more new manufacturing plants were established in Los Angeles County during June than in any month for the last five and one-half years. Twenty-two newcomers were on the list.

None of the new plants was an industrial behemoth, but with a few outstanding exceptions, industrial plants in southern California characteristically range from the backyard variety to respectable examples of individual enterprise in a land of opportunity. Capital in June's new plants amounted to $4,500,000 bringing the total for the first half of 1943 to $19,503,000. If insignificant in themselves, these figures carry a powerful wallop as chalking a trend, for they represent a gain of 19 per cent over the corresponding period last year. Still more important, this capital investment during the January-June period is the greatest in the first six months of any year in history for this section.

Only 580 new workers will be required for the whole caboodle of June's new plants, but this battalion represents an increase of 222 per cent over May, and 287 per cent over June, 1942.

Bear in mind that material controls and construction restrictions enforced by WPB make it impracticable for any plant to start operations without passing muster as an essential cog in the war effort. Remember that these plants were established in an area of extreme labor shortage, where the War Manpower Commission is extremely discouraging in the prospects it offers for recruitment of operating personnel. If you think the war is about over, don't look this way to prove your point!

IF you believe in the blind leading the blind, or listen to military commentators, you can read some significance into the fact that increased study apparently is being given to the matter of relieving the burden of transcontinental railroads to the extent that they are swollen by westbound traffic. Long before our declaration of war, predictions were made that the railroads would not be able to handle increased traffic. Soon after Pearl Harbor, West Coast newspapers began carrying stories that restrictions would be placed on shipment of consumer goods, clothing, and even food to the Coast; yet, today you can still walk into the place of business of your favorite wet goods dealer and buy a whole case of Pabst at a time. There is no denying that the railroads and the Office of Defense Transportation have done a wonderful job.

More thorough studies of points of origin and destination of widely separated types of goods are evident today, however, according to those who devote themselves to watching the tides of questionnaires—particularly when points of origin involved are east of the Rockies and destinations to the westward. This may mean that the railroads are going to be called upon to carry a still greater volume of traffic, possibly military traffic. Some declare that it represents, instead, anticipation of a day when rolling stock under constant pounding and lacking necessary maintenance, collapses almost simultaneously over all the lines like the wonderful "one-hoss shay."

Our friend, the Chamber of Commerce, takes the increased interest in cross-hauling as an omen of eventual fulfillment of its long frustrated hope to have an aluminum sheet mill located in southern California. Just before Pearl Harbor, this aluminum rolling mill was in the bag, an integral part of an aluminum colony of which the other members included the present reduction plant and extrusion plant. With the outbreak of war came talk of moving all major industrial plants well inland, and eventually a decision to let remain those which were here but to discourage establishment of new key industries. The upshot was that Spokane got the rolling mill.

THE chamber allows now that a few weeks ago the Office of the Chief of Transportation of the War Department requested evidence of "any and all instances of wasteful practices in cross-hauling involving distribution of war material coming under your observation." The chamber came right back with an up-to-date brochure, without palm trees or bathing beauties, but with evidence that during 1943 the southern California aircraft industry will require aluminum sheet necessitating 69,996 car days of freight haul from other sections of the country under present conditions and practices. This, the chamber alleges, represents tremendous waste, because the area has raw aluminum facilities, but no sheet mill, even though 82 per cent of all aluminum sheet used on the Coast goes to southern California plants. The Spokane mill is 1500 miles away. Eastern mills are 2400 miles away.

Spokane's mill is a *fait accompli*, and moreover, increased production at Boeing may pretty well take care of Northwest sheet production. The Los Angeles' Chamber discreetly suggests this: (1) A mill to roll 120,000,000 lb. of sheet annually, which would bring the total car days required to haul southern California requirements down to 43,746, a saving of 26,250 car days a year, or (2) A 180,000,000 lb. mill reducing car days to 30,650, a saving of 39,346 car days a year, or (3) Capacity sufficient to care for all southern California needs, saving 69,996 car days a year.

These three plans take into consideration that there would be shifts in shipment of aluminum ingots from Coast plants, so that net savings in transportation would be slightly less

BETTER CARTRIDGE CASES...FASTER VIA THE "HOT-CUP"

ONE EVERY 20 SECONDS! Steel slugs are dropped into top of TOCCO inductor which holds 12 slugs. A bottom slug, heated to required temperature, is ejected every 20 seconds—180 per hour.

The 25-year battle to convert cartridge cases from brass to steel has been won, saving critical copper and providing cases that can be reloaded many times.

One successful method of mass production of steel cases is by the "hot-cup" process. For 75 m.m. cases, steel slugs are TOCCO-heated to required temperature, extruded to a depth of 4″, then redrawn while still hot to 6″ depth. Subsequent stages in forming are by cold-drawing.

Reasons for using TOCCO induction heating for these operations:

TOCCO raises steel slugs to forging temperature so rapidly that scale is practically eliminated, saving wear on dies. Output of each TOCCO machine is 180 white-hot slugs per hour.

TOCCO heats the slugs uniformly for accurate forming and minimum scrap losses, helping overcome the major obstacle in use of steel for cartridge cases.

TOCCO heats the slugs at a rate to suit the forming operations. If a press delay occurs, no large furnace batches are lost.

TOCCO machine, clean, compact and devoid of radiant heat and hot gases, is located handily next to presses for faster production with good working conditions.

Why not look into the possibilities of TOCCO for improving *your* production for hot forming and forging.

THE OHIO CRANKSHAFT COMPANY
Cleveland, Ohio

TOCCO

World's Fastest, Most Accurate Heat-Treating Process

HARDENING
ANNEALING
BRAZING
HEATING for
forming and forging

in each instance than the savings shown on sheet shipments alone.

This paucity of aluminum finishing facilities on the Coast is definitely a fly in the ointment of those who hope that this section will be the undisputed capital of a light metal empire in the postwar period.

For the duration of the war, the far West will be, of course, self-sufficient to a greater extent in finished steel than in finished aluminum. Steel plate and structural facilities in the Provo district and at Fontana from a car mile standpoint slice far more off rolling stock requirements than a fistful of aluminum rolling mills. But again, finishing facilities for these products are of doubtful value in the postwar period, when emphasis will logically shift to tubular and flat-rolled products.

KAISER, too, has taken advantage of the increasing concern over transcontinental rail traffic to revive his request for electric furnace capacity at Fontana, according to creditable reports. Through Chad F. Calhoun, Fontana project manager, whose persuasiveness to a large degree has been responsible for approval of present facilities, WPB has been asked to endorse 100,000 tons of electric furnace capacity for the southern California plant, it is asserted.

Letters from Calhoun to Donald Nelson and the WPB Steel Division are quoted as saying, "There is perhaps no particular point in recalling that this additional 100,000 tons capacity could now have been in production in the third quarter had it not been eliminated from our program of October, 1942, or had our separate proposal for three electric furnaces, filed February 6, 1943, been approved, except to indicate that approval now of this capacity would eliminate and forestall any subsequent and continued regrets over the lost steel production."

The proposal has great merit from a postwar point of view in that it anticipates oil country and other requirements for special steel peculiar to this section.

In the Pacific Northwest, Secretary of the Interior Harold Ickes has shown unsuspected capacity as a diplomat in apparently finally resolving a long-standing dispute as to where headquarters for the new half million dollar U. S. Bureau of Mines electro-metallurgical laboratory should be located. When it first became evident that the laboratory would be approved for construction "somewhere in the Pacific Northwest," eastern Washington interests backed the candidacy of Pullman, Wash., where Washington State College is located; Seattle interests advocated a Puget Sound site; and Portland pumped for a site in its own vicinity. When it appeared that the choice rested between the two Washington proposals, the Bureau of Mines quietly acquired the grounds and buildings of an unused campus at Albany, Ore. Dismay gripped the Washington advocates who brought strong pressure for reconsideration of the decision. Last week Washington State College proudly announced that Secretary Ickes had agreed to place administrative and consultive staff members for the laboratory on the Washington State College campus and the laboratory proper at far-distant Albany, Ore.

. . . Cited for Awards . . .

• • • **The following companies** have been awarded the Army-Navy "E" for outstanding performance in war production:

Chicago Bridge & Iron Co., Newburgh, N. Y.

•

Becton, Dickinson & Co., Rutherford, N. J.

•

Cannon Electric Development Co., Los Angeles.

•

L. D. Caulk Co., Milford Plant, Del.

•

Corning Glass Works, Charleroi Plant, Pa.

•

Conmar Products Corp., Newark, N. J.

•

Difco Laboratories, Inc., Detroit.

•

Ethyl Corp., Baton Rouge Plant, La., Deepwater, N. J., Plant, Dye Works, Wilmington, Del.

•

Industrial Metal Fabricators, Inc., Oakley Boulevard Plant, Chicago.

•

Metro Tool & Gage Co., Chicago.

•

Monsanto Chemical Co., Plastics Division, Springfield, Mass.

•

National Carbon Co., Inc., Niagara Works, Niagara Falls, N. Y.

•

Phoenix Tool & Mfg. Co., Chicago.

•

Republic Aviation Corp., Farmingdale Plant, Long Island, N. Y.

•

Sloan Valve Co., Chicago.

•

Wiremold Co., West Hartford, Conn.

•

Reed-Prentice Corp., Worcester, Mass. (white star).

•

Maritime Commission

Union Metal Mfg. Co., Canton, Ohio.

•

Lynchburg Foundry Co., Lynchburg, Va.

•

Army-Navy "E"

Graham-Paige Motors Corp., Detroit.

•

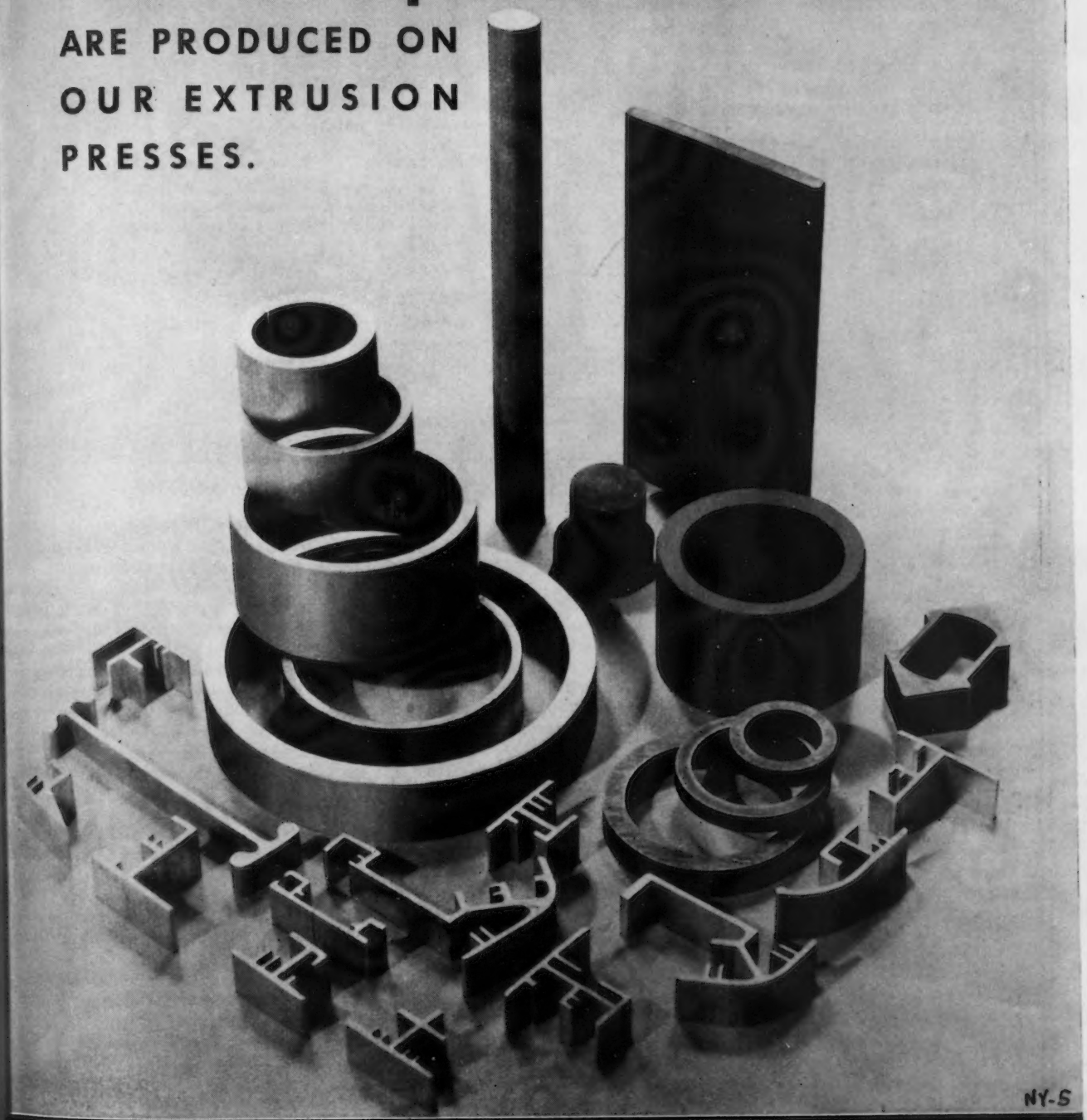
War Production 40% Attained; Spending Up 4%

• • • **Acting Secretary of War, Robert P. Patterson, declared the United States' war production goals only about 40 per cent attained at the end of June. Aircraft production for the next six months must achieve 61 per cent of the year's goal if military timetables are to be met. Air Force ground programs increased 1.1 per cent over May but fell far below the 4.9 per cent increase anticipated for June. The Department of Commerce says the current leveling off, which has changed little since February, is only temporary and is due in large part to changes in manufacturing programs.**

U. S. war expenditures during June amounted to $7,688,000,000, an increase of 4 per cent over May. Average daily expenditures in June, also up 4 per cent, were $295,700,000. To date, U. S. expenditures for war purposes amounted to $110,000,000,000.

These Shapes AND MANY OTHERS

ARE PRODUCED ON OUR EXTRUSION PRESSES.



NY-5

HYDROPRESS . INC.

ENGINEERS CONTRACTORS

HYDRAULIC PRESSES · ROLLING MILLS
PUMPS · ACCUMULATORS

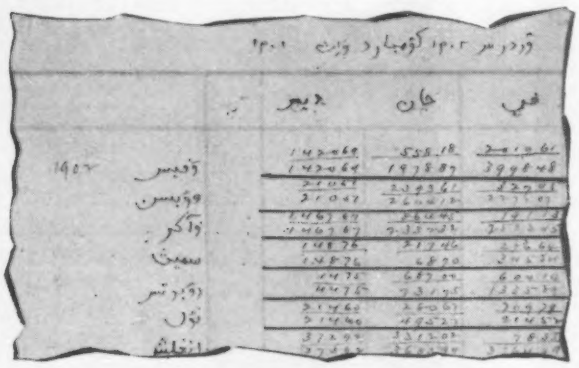
570 LEXINGTON AVENUE · NEW YORK · N. Y.

Fatigue Cracks . . .

BY A. H. DIX

He Kept the Score in Cuneiform

• • • That Hittite ironmaker's acknowledgement of an order received in 1200 B.C. (page 96, July 8 IA) rang a bell in the brain of C. S. Baur, our v.p. and g.m. He recalled that back in the early part of the century the secret records of your favorite family journal were kept in cuneiform, and produced this proof:



Arabic is what he thinks it is, but who the pundit was who wrote it, he doesn't recall. As our cuneiform experts are all out to lunch, we don't know what it says. For all we know the figures are a blind and it's a story about the two traveling burnoose salesman and the Arabian farmer's daughter.

He Learned All in a Beer Saloon

• • • That was in 1902, a period when business figures were as closely guarded as a navy code. In publication offices no figure was as secret as circulation volume. This was known only to the publisher, the print shop and God. If you knew it, you could boast about it, like having Paulette Goddard's private telephone number.

C.S.B. got it, that is the circulation figure, from a print shop foreman on the fourth floor in return for several beers. As the foreman is now dead, this revelation of his perfidy can do him no harm.

As it was, the foreman just beat the gun by eleven years, for in 1913 this and other journals established the Audit Bureau of Circulations, whose semi-annual reports leave the publisher with no more privacy than a frog being dissected by a near-sighted high school sophomore with surgical ambitions.

Circulation in Jolly Lots

• • • Although the A.B.C. has thrived here, it has resisted transplanting to other continents. In England, for example, among the questions one gentleman does not ask another is "How much circulation have you?"

Phil Thomson, public relations director of Western Electric and present head of the A.B.C., tells of a conversation he had a few years ago with an English publisher. "I have no doubt that you cover your field," he said, "but exactly how many copies do you print?" "That," answered the Englisman, reddening, "is something one does not discuss, but I can assure you the number of copies we mail out every Friday night amounts to a jolly lot."

Austere Shadows

• • • The foregoing is not told in derogation of the English. They are a remarkable people, and our admiration for them hits new highs weekly. They know how to run a country during wartime, and among their lesser virtues is that of giving aptly poetic names to prosaic things. For example, a letter just came in from the Bristol Aeroplane Co., Ltd., referring to "our Shadow Factories." As the term was new to us asked the omniscient brains department what it mea It means a sub-contractor.

And take the name given castings that England longer allows to be given a finish. "Austerity casting is what they are called. As austerity is a quality to prized while a nation is at war the term dignifies casting **au naturelle.**

Aptronym

Your mention that Gerald C. Koop is a lieutenant in Louisville police department reminds us to remind you that plant protection chief here at the Barnes Manufacturing Co. Harry Copper.

—*B. A. Nagelvoort, Executive Vice Pres. Barnes Manufacturing Co., Mansfield, O.*

Aching Void

• • • A happy combination of names is found in t report which R. W. Mungall, of the General Elect Wire Engineering Division, Schenectady, lets us pe at:

"In company with Mr. . . . . , I visited the Western Electric Co. on June 22, and saw Mr. . . . . of their Purchasing Dept., also Messrs. Tall and Hanson, of the Engineeering Dept.

Six Tubes to M-G-M

• • • Now that the Readers' Digest plans to publici the harpoons the Federal Trade Commission sticks in inflated claims in the advertising of cigarettes, oth throat remedies, cosmetics, hair tonics, and assort necessities, you can expect a power dive in the imagi ative content of the ads, both printed and aired.

However, we wish to sound a note of warning. Wh the Commission is to be praised for guarding us agai patent medicines that damage our personal plumbi and toothpastes that deplate our enamel, we fores grave consequences if the psychological benefits of ce tain kinds of advertising are ignored.

Take, for instance, this testimonial to which the Co mission objects:

"I bought a tube and began to clean teeth and massage gums with it. Now—9 months later—I am leaving for Hollywood and the movies."

She doesn't say the toothpaste is the reason she l for Hollywood. Maybe she didn't get the job. It m even be that the product did nothing for her denture but the important point is that she may have thoug it did. The result would be a leap in her self-confiden and the possible acquisition of a flashing smile exte ing clear back to the rear molars, enabling her to spre cheer in carload lots.

If the Commission lays a cold, matter-of-fact ha on the advertising of cosmetics and perfumes—if requires the manufacturer to *prove* that his prod actually makes the user devastating—if it fails to ta into account psychic factors, we predict a catastrop drop in the morale of half the population.

Stopper

• • • This Little Pig Went to School!—*Phoenix Ma facturing Co.*

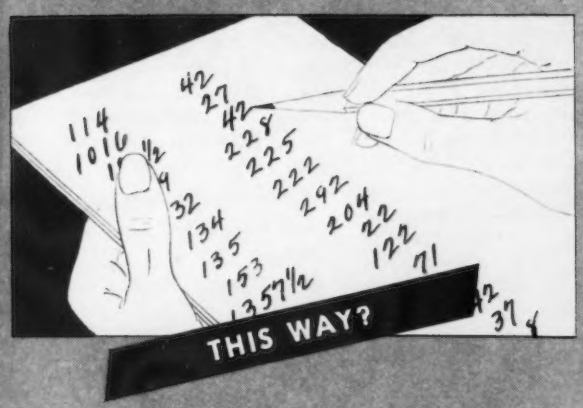
Puzzles

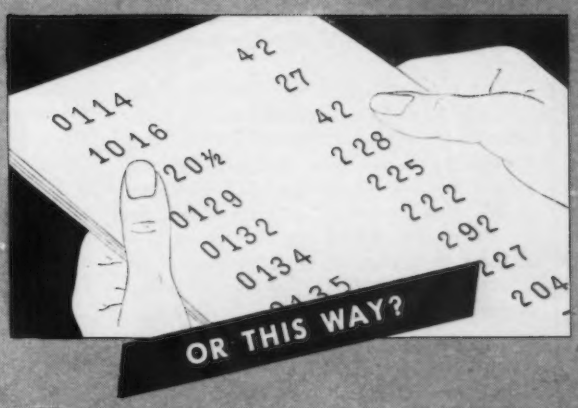
The solution to last week's wine problem is too long print here. If it bothers you drop us a line and we will c the answer from our puzzle book.

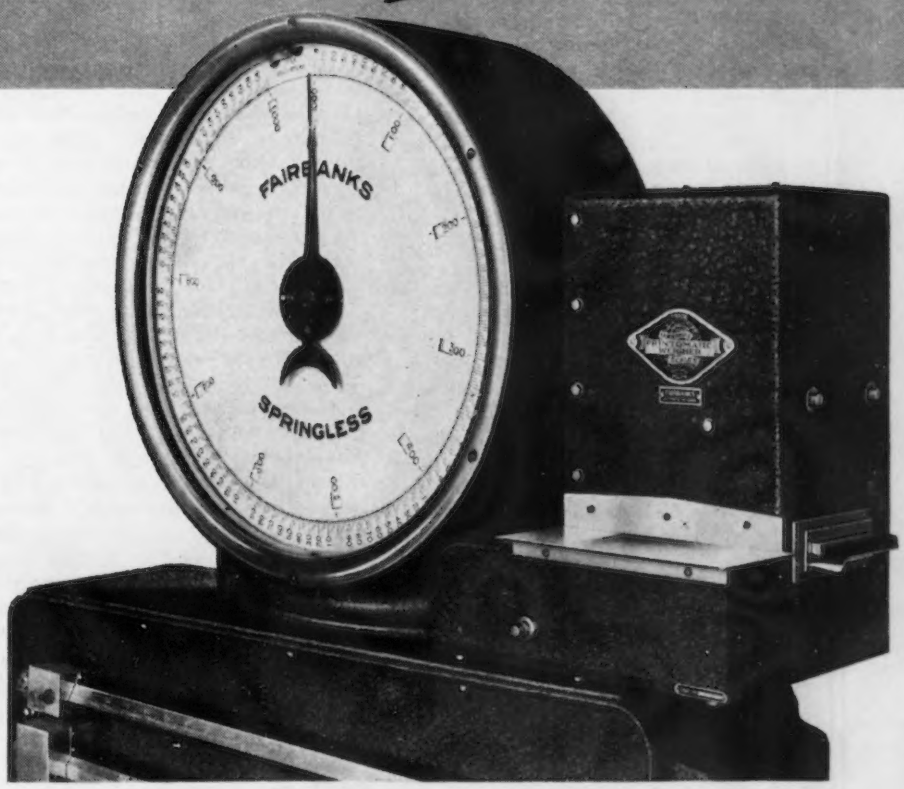
If it takes you less than four minutes to find the c in this one, sent in by W. W. (M. H. Treadwell Wallace, even if it isn't new to you, give yourself an A in mental alertness:

Three men enter a hotel and pay $30 for a suite. clerk later discovers the price is $25 and gives the bell $5 to return to the men. The bell boy cannot divide the equally among the men so he keeps $2 and gives each $1. The men then had paid $9 each, or a total of $27, the bell boy had $2. -What became of the other $1?

How Are Weight Records Made In Your Plant—







For precision weighing and precision recording use Fairbanks Scales with Printomatics

• Of course, *sustained accuracy* in the weighing machine is vitally important. But no matter how accurate the machine is, unless weights are *accurately recorded,* the element of error still remains.

Fairbanks Scales with Printomatics eliminate these human errors—because the scales read the weight automatically and then automatically make a *printed* record of the weight. In addition to eliminating errors, Fairbanks Scales can be fitted into your production flow to do a variety of jobs better than they can be done in any other way. Fairbanks Scales weigh loads in motion . . . count small parts . . . record the flow of liquid chemicals . . . guard secret formulas in compounding . . . control batching . . . automatically control ingredients . . . automatically control aggregates . . . and many other jobs.

The organization which made Fairbanks the greatest name in weighing brings you 113 years of scale manufacturing experience. That, too, is worth serious consideration.

Fairbanks, Morse & Co., 600 S. Michigan Avenue, Chicago, Illinois.

FAIRBANKS-MORSE

DIESEL ENGINES
PUMPS
MOTORS
GENERATORS
SCALES

WATER SYSTEMS
FARM EQUIPMENT
STOKERS
AIR CONDITIONERS
RAILROAD EQUIPMENT

FAIRBANKS SCALES

Scales

Dear Editor:

JEEP'S NAME-GIVER

Sir:

In a recent issue, you say that the history of the origin of the term "Jeep" is as obscure as it was three years ago. I think we can help you out.

The man who first applied the term "Jeep" to an army vehicle, which happened to be one of our tractors converted to serve the Armed Forces, was a former employee of Minneapolis-Moline—James T. O'Brien, Acting 1st Sergeant, Receiving Company No. 4, Fort Snelling, Minn. I quote from a letter written to me by Sgt. O'Brien under the date of March 31, 1943:

> "In 1940, while on maneuvers at Camp Ripley with the 109th Ordnance Company, Captain Schiska commanding, I was placed in charge of the testing of four Minneapolis - Moline prime movers, which were subsequently assigned to Company A Tank Company from Brainerd, Minn., Captain Miller commanding, as reconnaissance vehicles.
>
> One evening in a gathering of enlisted men, it was suggested that a short descriptive name be found for these vehicles, such names as 'alligator' and 'swamp-rabbit.' I brought forth the name 'jeep' as a result of reading 'Popeye the Sailorman' in which Eugene the Jeep appears as a character, and the fact that the vehicles would go where you would least expect them to go. This name was unanimously accepted and subsequently painted on the vehicles."

B. D. GRUSSING,
Advertising & Sales Promotion Manager
Minneapolis-Moline Power Implement Co.,
Minneapolis, Minn.

THERMAL SHOCK RESISTANCE

Sir:

I have read, with considerable interest, an article on Magnesite Refractories by J. H. Chesters of Sheffield, England, which appeared in your June 10, 1943 issue. I would like to call your attention to Table 4 on page 78 of that issue. On the last horizontal line of this table there are given data concerning the thermal shock resistance of various kinds of magnesite brick, Mr. Chesters does not describe in the article the method of testing, but I presume it is a type of test which he has described in other articles and which was used by him at the Research Department of the United Steel Companies, Ltd. in England. I am familiar with this test and obtained the details of it from Mr. Chesters the last time I visited him at his laboratory in England.

Three of the bricks listed (M.1, M.2 and M.3) have a spalling resistance corresponding to 30+ reversals, but a brick designated as M.5 has a spalling resistance of only 2 reversals. I am inclined to believe that some error has been made either in publishing this figure or in determining the quantity in the laboratory.

You will perhaps wonder why I am so exercised in pointing out a small error of this type. The reason is that the brick designated as M.5 is described as a chemically bonded magnesite brick. It is the only chemically bonded brick reported in the table, the other bricks being all of the burned variety. If an American reader were to form a general opinion of the value of chemically bonded magnesite brick by the data given by Mr. Chesters, I am afraid the opinion would be erroneous.

We are the largest manufacturers of chemically bonded magnesite brick in the world. We have pioneered this process of making brick. One of the advantages of the brick is its superior thermal shock resistance over all other types of magnesite brick manufactured by us. I have tested these bricks using Mr. Chester's method and, after 60 reversals, the brick was practically unaffected. Our laboratory reported that they saw no reason for continuing the test beyond 60 reversals. As you perhaps know, the Chesters test is not a recognized test in America. We have other and more elaborate methods of evaluating our brick. Nevertheless I thought I would call this matter to your attention and ask in what way the American reader could be properly informed about American chemically bonded magnesite bricks so as to avoid any erroneous impression which the Chesters article might possibly have caused.

R. P. HEUER,
Vice-President
General Refractories Co.,
1600 Real Estate Trust Bldg.,
Philadelphia 7, Pa.

FOREIGN PATENTS

Sir:

Kindly advise how we may obtain copies of these foreign patents, as listed in your July 8 issue, beginning on page 115:

A.P.C.—240,370—Machine for cutting by generation of involute teeth.

A.P.C.—392,532—Gear shaping machines.

A.P.C.—362,833—Press for manufacturing tubes, rods, etc.

A.P.C.—384,913—Devices for manufacturing cable sheaths.

PENNSYLVANIA MANUFACTURER

● Foreign patents may be obtained from the Office of Alien Property Custodian, Chicago, for $15 each. Letters sent to The Iron Age will be transmitted to the Alien Property Custodian.—Ed.

CONLEY, NOT CANDEE

Sir:

We read THE IRON AGE regularly. It keeps us up to date in various ways. For instance, in your July 1 issue, I notice that E. T. Candee is the retiring president of the American Electroplaters Society.

Last year you graciously announced that a man named Conley had been elected to that office. Probably he declined to serve. I am sure he was at the convention this year, however, for I saw him conversing with Mr. Bregman, who reported the meeting for you, several times during those three days.

CHAS. C. CONLEY
Stolle Corp.,
Park St.,
Sidney, Ohio

● Mr. Conley's letter is writ sarcastic, and with good reason, for it was Charles C. Conley, who just retired as president of the Society, not Ellsworth T. Candee, as stated on page 58 of the July 1 issue. Mr. Candee was Mr. Conley's immediate predecessor, as president of the Society. Our apologies to all for careless captioning.—Ed.

CUPOLA MALLEABLE IRON

Sir:

I would like to get a book on "Cupola Malleable Iron." Please give me name and address of publisher, if possible.

M. W. SCOTT,
Mech. Mgr.
Pyle-National Co.,
1334 North Kostner Ave.,
Chicago, Ill.

● We know of no book on this subject. However, a considerable number of papers on it have been presented before the American Foundrymen's Assn., 222 W. Adams St., Chicago, Ill. Copies may be obtained by applying to the A.F.A.—Ed.

MACHINE TOOL PRIMER UP 50c

Sir:

May we thank you for the fine review of our book, "The Machine Tool Primer," on page 77 of your July issue? We have received orders for many copies, as a result of this review.

When the review was published, the price was $1.50, but since then it has been necessary to change the price to $2.

HERBERT D. HALL,
President
Herbert D. Hall Foundation,
1060 Broad St.,
Newark, N. J.

MACHINING ALUMINUM

Sir:

Will you please send all the information at your disposal on the machining of aluminum. We are going to machine this stock on 7 Spindle Conomatics and 6 Spindle Acme Gridleys.

ROBERT F. BACON,
Supt. Screw Mach. Dept.
Ruud Mfg. Co.,
2019 Factory St.,
Kalamazoo, Mich.

● Write the Aluminum Co. of America, Gulf Bldg., Pittsburgh, for the 1943 edition of its bulletin, "Machining Alcoa Aluminum." This will give you all the information you need for screw machine operations on aluminum parts.—Ed.

Left: Laying corrugated steel mats. Inset: Fastening mats with handy Spring Clips.

Photos by U. S. Army Signal Corps.

SPRINGS FOR AIRPORTS— *NEW GUINEA STYLE!*

Recipe For A Portable Landing Field—Uproot trees, tear away undergrowth, plow earth level, lay steel mats, link together with Muehlhausen Spring Clips.

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This Industrial Week . . .

- **WMC's 48-Hr. Week Policies Flayed**
- **War Goods Output Slightly Higher**
- **Steel Campaign Makes New Gains**
- **Ingot Output Snaps Back to High Level**

A STRONGLY worded complaint against the War Manpower Commission for allegedly creating an "intolerable" situation in the iron and steel industry with its 48-hr. week policies has been drawn up by the management members of the WMC Management-Labor Policy Committee.

After recording all the steps occurring since late 1942 and revealing correspondence over the 48-hr. week in steel, the management members conclude that "the WMC through its chairman has rejected practically all recommendations and repeated pleadings of the industry; has deferred consistently to recommendations of the United Steelworkers of America union; has created a condition in the iron and steel industry, through ill-advised and needlessly restrictive regulations, that has already caused confusion and disruption among employers and employees, that has already contributed to loss of production and that will be of serious detriment to steel production if these regulations are carried out literally."

WMC, according to the management members, has indicated awareness of the dangers in the situation and is now endeavoring to make corrections by "practical administration of an impractical regulation instead of through prompt and straightforward amendment of the defective General Order No. 8." The management members say WMC is "determined to run the risks of this hazardous course unless and until losses of steel production or other developments detrimental to the war effort clearly demonstrate and make obvious the necessity for change."

THE management members charge that employer-employee relationships have been disturbed contrary to established collective bargaining agreements in the iron and steel industry. They conclude that "this committee is obligated to initiate considerations that will lead to correction of conditions under General Order No. 8 and precluded similar developments in other areas or activities."

Meanwhile, the wartime industrial front in the United States is more active after a temporary recession. The smashing success of the Allied attacks in Sicily, result of remarkable planning, has benefited industrial morale, steel production is stronger following the return of the majority of coal miners, and hopes are brighter that Congress may permit the retention of reasonable post-war reserves by industries out of their profits.

The third week of the "Share-the-Steel" drive shows recovery of approximately 300,000 net tons of steel through cancellations reported to WPB. The tonnage is broken down into about 270,000 tons of carbon and 30,000 tons of alloy steel. While the drive on inventories is half through, real figures on cancellations will not be available for some time because WPB has only 3000 or 4000 consumers reporting out of 35,000 estimated by the WPB Steel Division. The response of consumers is considered remarkable.

CONCERNING hopes that Congress may permit the retention of reasonable post-war reserves by industries out of their profits, a committee which has been studying the matter is believed to be inclined toward making a favorable report. The machine tool industry in particular is vitally interested in this subject since a very large percentage of the billions of dollars worth of machine tools will be suitable for civilian production long after the war is over. At present, the industry faces the possibility of decreased profits this year as the result of the passage of an act requiring the renegotiation of about $700,000,000 of DPC contracts.

Currently, one large war contractor alone is reported to be returning to the government for disposition into war production channels 100,000 surplus and obsolete machine tools, residue of one major job alone. There are several thousand distinct sizes and shapes. This equipment is being sold at exactly what the government paid for it.

Congress also will have before it for consideration after the recess the Murray Bill to expedite the settlement of war contracts, a subject which probably has given more worry to industrialists recently than any other single topic.

Plans for the construction of some 29 detinning

Civilian Requirements to Be Met

Washington

• • • Despite the fact that steel remains tight, the WPB Requirements Committee is going to allot to the Office of Civilian Requirements the major portion of 143,000 tons of steel for making vitally needed civilian goods. Sufficiently high urgency ratings and allotment numbers are going to be given to prevent the military demand from killing off the allotment.

News Highlights in This Issue

plants throughout the nation are reported to have been revised. With additions completed to already existing equipment, mainly plants in New Jersey and in the Pittsburgh and Chicago districts, the remainder of the unfinished program, except that scheduled for Birmingham, is understood to be cancelled. Factors are believed to include the reduction in the tin coating on cans and the improvement of tin supplies.

CONCERN is being expressed at Washington over the drop in copper production. . . . Merchant shipyards are reported shifting plate inventories from comfortably stocked yards to those not so well off. . . . The ordering of a large number of pontoons for the Navy has created mild excitement among manufacturers this week. About 17 firms were given contracts for delivery through 1944. . . . Orders for steel for agricultural implements are heavier.

WPB is reported to have worked out an alternate procedure for experimental use in fourth quarter, opposing the stripping of the Class B Products List to 21 items which will channel B components into A schedules without resorting to direct allocations. . . . Wire rope distributors report a sharp increase in orders for rope to be used to lash down cargoes on merchant ships. . . . The Castings Section of the WPB Aluminum and Magnesium Division has warned purchasing agents that a review of military programs for the next 18 months shows that the procurement of aluminum castings will become more and more difficult. . . . The New England foundry trade is reported fast drifting into a precarious position through a slump in orders, but in Michigan the chief problem for foundries is said to be the desperate shortage of workers.

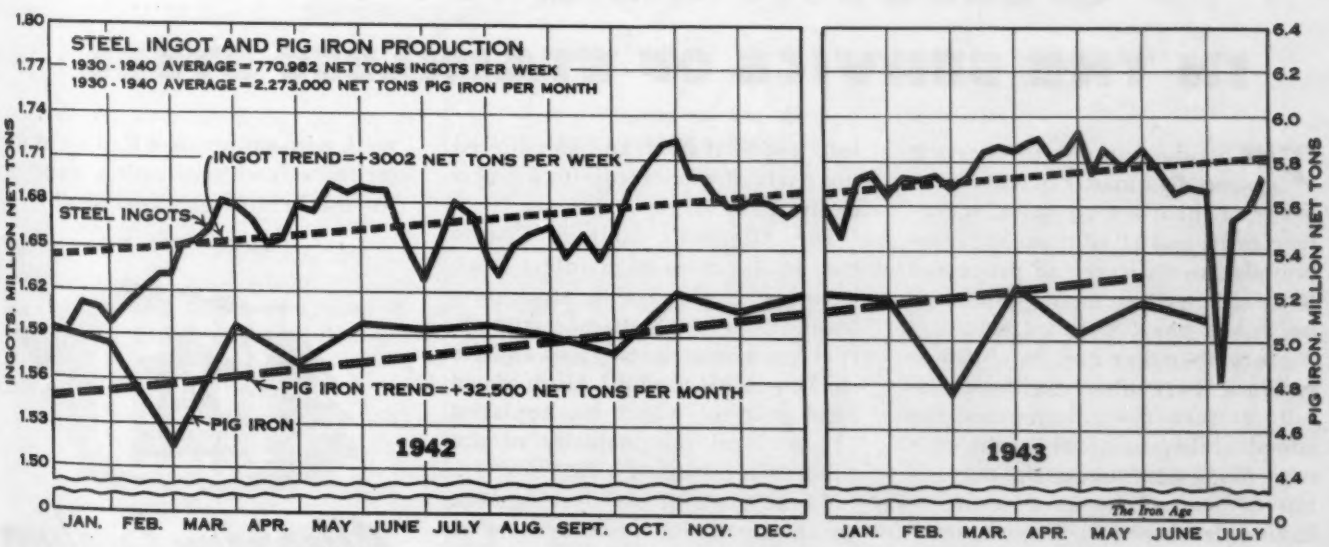
The controversy between the Army, the Office of Civilian Requirements and the members of the WPB Requirements Committee over whether civilians shall have a minimum of consumers' goods is nearing a showdown. It is said that while Army warehouses are piled high with consumer goods, the Senate Truman Committee has asked the Army for information regarding inventories. The Army is preparing to forestall criticism by declaring part of the goods surplus and making them available for civilian purchase, it is reported.

If domestic railroads are unable to get the number of cars and locomotives which they believe are necessary to keep the transportation system from falling apart, some roads may attempt to expedite matters by having the Army and Navy include railroad needs under their own requirements. However, it is believed that the railroads' needs will be given high consideration at the earliest opportunity.

NATIONAL steel ingot production this week rose to 98.5 per cent of capacity from 95.5 per cent last week. Responsible for this gain is the increase of 7 points to 99 per cent in the Pittsburgh district. Gains are also noted in Youngstown which is up one and a half points to 95 per cent; in Cleveland where ingot output jumped two points to 100 per cent; Buffalo up two points to 106.5 per cent; Wheeling up two to 87 per cent, and Birmingham up one point to 103 per cent. St. Louis operations have fallen off 10½ points to 109.5 per cent and in the Eastern area output has dropped 12½ points to 95.5 per cent. Chicago at 99.5 and Philadelphia at 93.5 per cent are unchanged from last week.

New Magnesium Plant Operating

• • • First units of the government owned magnesium plant operated by Electro-Metallurgical Co., near Spokane, Wash., have been operating for several weeks and the plant is scheduled to be fully completed by Aug. 1, eleven months after construction was started by H. K. Ferguson Co. A thermal reduction process is being utilized. Around 800 persons will be employed at the new plant.



Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	S.Ohio River	St. Louis	East	Aggregate
July 15	92.0	99.5	93.5*	93.5	98.0	104.5	85.0	102.0	100.5	102.0	107.0	120.0	108.0	95.5
July 22	99.0	99.5	95.0	93.5	100.0	106.5	87.0	103.0	104.5	102.0	103.0	109.5	95.0	98.5

* Revised

O.W.I. by Palmer, in an Allegheny Ludlum Plant

GRAY... *and Skilled*...

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THE production of alloy steels is essentially a matter of technique. Many of them are complex, metallurgically; and all of them are compounded to a nicety and processed to specific requirements of surface finish and physical properties.

More often than not, the ability to produce these alloy steels successfully to such close limits, and the added ability to multiply the tonnage many times under the necessities of war, come as a result of having developed the *original* technique. The accumulated knowledge and experience of the mill technicians and men who developed an idea into a special steel, and shouldered the trials of pioneering it commercially, make all the difference.

For Allegheny Ludlum, that is true in the cases of stainless steel, gasoline engine valve steel, and many alloys for electrical purposes. It is true also of certain tool and die steels, notably the DBL High Speed Steel analysis, which has replaced "18-4-1" on the majority of the nation's production jobs.

These steels of our development are among the most vital of the war. We want to place our "know-how" completely at your disposal, to help you select them wisely and use them well, without waste. ● Call on us for technical and fabricating data, or for the help of our Technical Staff.

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News of Industry

o o o

Murray Bill Plans to Expedite Settlement Upon Termination of War Contracts

Washington

• • • **Involving multi-billions,** mandatory advance payments of not less than 75 per cent of the amount of contracts within 30 days after certification would be paid prime and subcontractors upon termination of war contracts under a bill drafted by Senator Murray, Democrat of Montana.

The measure, a preliminary draft of war contract termination legislation, was submitted to the American Small Business Committee of which Murray is chairman. Recommendation was made for official action by the committee when Congress reconvenes after the summer recess.

It was pointed out that although a prime contractor's capital is tied up with work performed on a terminated contract it is impossible to obtain immediate and final payments due him. Also, the Murray report said, it is impossible for various subcontractors to obtain final payment until after settlement between the Government and the prime contractor.

"**Accordingly,** unless some type of prompt and liberal advance payments are made both to the prime contractor and his subcontractors," the report warned, "conversion to other types of production will be seriously handicapped and widespread unemployment and insolvency will ensue."

The report said that although war contracts estimated at $50,000,000,000 to $75,000,000,000 will be terminated after the war, shifting military requirements will undoubtedly call for a great volume of contract termination during the course of the war. The War Department alone, it was stated, reported that during the war period it has already terminated 3764 contracts, of which more than 2300 are still unsettled. More than 400 of the latter number, were reported to have remained unsettled for more than six months, while in only 44 cases have advance payments been made—and to prime contractors only. The War Department reported that hundreds of prime contractors and many thousands of subcontractors have not been reimbursed, that many of them are financially embarrassed, and "their dissatisfaction is very great."

The Murray bill also allows for direct or guaranteed loans above the 75 per cent minimum payment and provides for uniform policies and procedures under the direction of the WPB Chairman. The Montana Senator said that the bill leaves for additional legislation or for administrative determination such matters as the terms of final settlement, the amount of severance pay granted employees, the disposal of inventories, the types of assistance needed in obtaining reconversion to other lines of production and the decision as to what kinds of war contracts and whose war contracts are to be continued when production is cut back or hostilities are ended.

Recognition is given in the bill to two situations that will take place upon the termination of prime and subcontracts: (1) Where the changes in the military program make it desirable to discontinue certain production; and (2) where the cessation of hostilities will make continued production of a great many items undesirable.

Foreseeing difficulties of the present agreements whereby the Army and Navy may terminate contracts at any time with contractors and subcontractors resorting to a similar protective clause in subcontracts the bill proposes a policy not only to expedite final settlement, but also, among other things to minimize the effects of delays in final settlements by making prompt and liberal payments in advance. It is also stated to be the national policy to establish uniformity in the policies and procedures of the departments and agencies in dealing with the problem of termination, to pay particular attention to the smaller producers, and to facilitate prompt and efficient conversion to other production.

The mandatory advance payment plan would supplant the discretionary power now given the President under the First War Power Act to authorize advance payment.

Because the bill would apply upon the termination of any contract under authority of Section 201 of the First War Powers Act, Murray expressed the belief that it would apply in all of the important cases. Under this section the President authorized contracts by negotiation.

The bill would prohibit the government from deducting from advance payments any set-off or counterclaim, except that it must deduct previous progress or partial payments or unliquidated advance payments or payments on account. The contractor would be required to exclude an amount sufficient to cover payments to his subcontractors.

Permission would be given the contractor or subcontractor to certify minimum amounts due, and in such cases, the certification would not bar a larger claim on final settlement. This provision, it was pointed out, would facilitate the filing of demands.

Provision also is made for the recovery of the amount of the statutory payment when a contractor does not receive the minimum amount due him within the stipulated period by suit in the court of claims or in a district court.

Procurement agencies would be given authority to make loans or guaranties on loans to contractors or subcontractors and to purchase or acquire assignments of the rights of subcontractors.

New Form Sent Out For Renegotiation

Washington

• • • A new renegotiation form to be filled in by war contractors is being sent out by the War, Navy and Treasury Departments, the Maritime Commission and the War Shipping Administration Price Adjustment Boards. The contractors to whom the forms are sent will report their volume of war business so that the Price Adjustment Boards can winnow out the approximately 40 per cent of them not affected by the renegotiation law because their war volume falls below $100,000. Copies of the form and instructions for filling it out may be secured by writing to the Departmental Price Adjustment Boards, P. O. Box 2707, Washington, D. C.

WMC Flayed for Creating "Intolerable" Situation

• • • **"As viewed** by the management members of the War Manpower Commission's Management-Labor Policy Committee, an appraisal of the minimum wartime work-week situation in the Iron and Steel Industry as it stands today is as follows:

"1. The WMC, through its chairman—

(a) Has rejected practically all recommendations and repeated pleadings of the industry;

(b) Has deferred consistently to recommendations of the United Steelworkers of America;

(c) Has created a condition in the iron and steel industry, through ill advised and needlessly restrictive regulations, that has already caused confusion and disruption among employers and employees, that has already contributed to loss of production, and that will be of serious detriment to maximum steel production if these regulations are carried out literally;

(d) Has indicated awareness of the dangers in the situation and is now endeavoring to effect correction thereof by "practical administration of an impractical regulation" instead of through prompt and straightforward amendment of the defective General Order No. 8, and

(e) Is determined to run the risks of this hazardous course unless and until losses of steel production or other developments detrimental to the war effort clearly demonstrate and make obvious the necessity for change.

"2. Notwithstanding the chairman's assertions to the contrary, the WMC, without consulting the Management-Labor Policy Committee, has effected a major policy decision as to administrative processing of a minimum wartime workweek regulation, and in so doing has invaded and disturbed employer-employee relationships contrary to established collective bargaining agreements in the iron and steel industry.

"Because the WMC has created an intolerable situation in the iron and steel industry and numerous appeals will necessarily arise therefrom, and because the Management-Labor Policy Committee is part and parcel of the WMC's policy making and appeals machinery, this committee is obligated to initiate considerations that will lead to correction of conditions under General Order No. 8 and preclude similar developments in other areas or activities."

Supporting the conclusions above, the management members of the War Manpower Commission's Management-Labor Policy Committee (consisting of R. Conrad Cooper, Joyce O'Hara and H. K. McCook) have compiled a review statement regarding the 48-hr. week in iron and steel. This statement records all the steps occurring since late 1942 and reveals the correspondence on the subject.

Following the signing on Feb. 9, 1943, of the executive order establishing the minimum wartime workweek of 48-hr., the committee leaned to the belief that the 48-hr. week should be invoked only when, as and if needed in areas or activities of critical labor shortage and that extension of the workweek should permit orderly transfer of displaced workers. These principles were adopted in Reg. No. 3 issued by WMC on Feb. 22.

On April 26, the iron and steel industry advisory committee of the WPB expressed to H. G. Batcheller, director of the Steel Division the opinion of that committee regarding adoption of the 48-hr. week. (A question in this connection was raised on March 23, 1943, in a letter from Philip Murray, president of the United Steelworkers of America). In general, the industry advisory committee asserts it offered no opposition to the 48-hr. workweek; in fact endorsed it where production needs require it, but opposed any arbitrary action in this connection that would detract from maximum steel production.

It was pointed out that many iron and steelworkers were already putting in 48 hr. per week and more; that the industry had been producing at 99 per cent of capacity; that allocations made it impossible at times to operate some divisions 40 hr. per week. It was also pointed out that Philip Murray in a speech April 11 had predicted widespread unemployment due to overproduction.

On April 30 and May 1, 1943, the committee met in special conferences at the request of and with Paul V. McNutt, chairman of WMC, to consider a proposed General Order No. 8 establishing a minimum wartime workweek of 48 hr. in blast furnaces, steel works, and rolling mills of the iron and steel industry. Despite opposition of the committee's majority, the chairman executed General Order No. 8 on May 1, 1943. A statement concerning this action was filed by two agricultural members of the committee and a letter of protest was filed by the management members. The agricultural members said the "hold the line" order of the President would be violated in spirit. The management members protested against the haste in issuing the directive which they said would produce no more steel nor assist the manpower program, but would add to production costs and be disruptive to industry relations.

Section VI of General Order No. 8 specifies that:

"Regional and area manpower directors are authorized to determine all questions arising within their respective regions and areas with respect to the interpretation and application of this order in conformity with such procedures and instructions as the Executive Director of the WMC may issue.

"Exemptions shall be subject to instructions from the Chairman, and exemptions shall be allowed by regional directors only in accordance with such instructions."

The WMC chairman promptly effected an arrangement whereby a special sub-committee of the Management-Labor Policy Committee (consisting of one management member

Courtesy "The Porthole"

in Steel Industry with its 48-Hr. Week Policies

and one labor member) was appointed to assist in the development of instructions required under Section VI of General Order No. 8. The committee asserts the special sub-committee was not permitted to function on the assignment for which it was created.

The review statement points out that the CIO issued a press release May 5 quoting Murray as saying the 48-hr. week was "a signal victory for the United Steelworkers of America,"

Letters Reveal Industry Experience With Order

(Letter to Paul McNutt from W. S. Tower, representing Iron and Steel Industry Advisory Committee, Dated June 30, 1943.)

I wish to acknowledge receipt of your communication of June 24, 1943, denying the Petition submitted by me on behalf of the Iron and Steel Industry Advisory Committee for review and amendment of General Order No. 8 and Regulation No. 3. . . .

We have noted the reasons given by you for the denial of our petition and we have particularly noted the expressions of reassurance by you to the industry as to the manner in which you expect the order and instructions to be administered and applied by your regional and area directors. While such assurances are encouraging, we regret that they do not take the form of specific modifications of the order and instructions. We still feel that such modification is the only adequate relief, and the only way in which uniformity of administration can be secured. We cannot agree with your suggestion that our concern is due in part to a misunderstanding of the provisions of the order and instructions. However, the already reported conflicting interpretations by some of your regional and area directors show conclusively that there is considerable misunderstanding of the order and instructions on their part.

It is not necessary to reiterate here the fears previously expressed to you on several occasions as to probable interference with maximum steel production as a result of the order and instructions. However, at a meeting held today of representatives of companies comprising over 90 per cent of the tonnage in the industry, specific incidents were reported showing that there has already been loss of production directly due to manpower shortages in plants precluded from hiring under this order and its restrictive application. An illustration of the manner in which the order and instructions have been applied by some manpower agencies is shown by the attached letter (Exhibit A) from P. T. Fagan, area director at Pittsburgh, to steel companies in that area, dated June 12, 1943.

Further illustration is furnished by the attached copy of a letter dated June 28, 1943, received by me from a member of the industry (Exhibit B). This letter, which is typical of reports made at today's meeting, portrays graphically the confusion and delays encountered by members of the industry as a result of efforts of agencies of WMC to apply the order and instructions in their present form. The requirement that, as a condition precedent to replacement hirings, full information shall be furnished as to specific jobs and departments for which hirings are to be made, illustrates clearly the practical impossibility of literal compliance. Since the employer cannot ordinarily know in advance what vacancies will occur, but must wait until they do occur, he is subjected to delays harmful to production while awaiting permission to hire. . . .

Notwithstanding our continuing concern over this situation, we wish to assure you that the industry is making and will continue to make every effort to comply in good faith with General Order No. 8 and the instructions thereunder. The industry will feel, however, that it and its individual members have a duty to call to your attention occurrences which in their judgment demonstrate need for the ultimate modification of the order and instructions, inasmuch as the responsibility for any lessening of steel production as a result of the order and its administration will rest solely upon the War Manpower Commission.

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EXHIBIT A

(Letter received by member of industry from P. T. Fagan, Pittsburgh area director, dated June 12, 1943)

The purpose of this letter and the enclosed report form and instructions is to assist you in complying with the terms of General Order No. 8. . . .

You should note particularly that the interpretations of the Order require consultation with a representative of your establishment's collective bargaining agency on most matters relating to the application of General Order No. 8.

You should also note, that, *under any conditions*, until the enclosed report form is completed, signed by you and the representative of your establishment's bargaining agency, and returned to this office, you are not to hire any additional workers for your establishment. . . .

Specific authorization from the United States Employment Service to hire will not be granted until Form WMC-25 has been filed and approved by this office.

•

EXHIBIT B

(Letter received by Mr. Tower from vice-president of steel company, dated June 28, 1943)

You are, of course, familiar with the industry's efforts to forestall the obvious effect on steel production of the 48-hr. minimum wartime work week, and with the added demands for production in the third and fourth quarters, made coincidentally with the application of the 48-hr. order. You might be interested in how our actual experience with the administration of the order is developing. On June 19 we filed, with a number of regional directors of War Manpower Commission, requests for exemption from various sections of the order, made out to the best of our ability in the absence of adequate instructions. The first acknowledgment we received from any region was dated June 24 and declined to consider the request on several grounds—insufficient information, improper form, the fact that the Regional Director had not consulted with representatives of the collective bargaining agency, etc. We were further advised:

> "According to my instructions 'no provision is made for exemption from the requirements of Section V of the order.' As a result, approval of the War Manpower Commission is required for workers hired after June 1. I am delegating this authority to the area in which steel mills are located so that there will be no delay in filling essential employment needs and so that the production of vitally needed steel will not be held up because of manpower shortages. Mr. Walter M. Given, Director of the U. S. Employment Service for West Virginia, has been authorized, subject to review by me, to approve the hiring of groups of workers. In requesting approval you shall submit to Mr. Given full information as to specific jobs and departments for which hirings are to be made, together with full information showing that these jobs could not be filled by transfer of workers from elsewhere in the establishment who are not working 48 hours per week. Before approving of hirings, it will be necessary for Mr. Given to consult with representatives of labor in each establishment."

A list of the information required in requests for exemption was appended, as follows: Name of Department for which exemption is requested; product or products being produced; capacity operation of department in tons; production of department in tons as required by WPB directives or material allocations; number of workers required for capacity operations; number of workers required for production required by WPB directives or material allocation; a tabulation for each department of workers who are not working 48 hr. per week classified by broad occupational groups such as skilled, semi-skilled and unskilled; the number of hours now worked by each group of these workers; wage rates paid each group; an explanation of why workers not working 48 hr. per week cannot be either scheduled for 48 hr. per week employment or transferred to another department for enough time so that they will work 48 hr. per week.

I hardly have to suggest to you the difficulty of operating at all, let alone increasing production, under the restrictive influence of this order, administered as indicated by this first experience. Merely to compile the information requested will require no little time and manpower and it will be out-dated by the time it is compiled. *It does not seem to be realized that when we are short a helper on a furnace we need a man, not a questionnaire.*

and that "the union must not permit any company under the guise of the 48-hr. week to reduce the pay of any employee for any work performed during the 48 hours."

On May 8, 1943, the iron and steel industry advisory committee transmitted to Batcheller a letter signed by Walter S. Towers which reaffirmed that committee's position with respect to the 48-hr. week; expressed its belief that the arbitrary order to which the industry is now subjected without regard for local production or manpower needs might retard, rather than promote, the effective prosecution of the war; and requested opportunity for representatives of that committee to meet with the WMC chairman to discuss the situation.

The committee met with the WMC chairman on May 13. They presented a comprehensive analysis of problems confronting the industry under General Order No. 8, offered specific suggestions as to the solution thereof, and extended their cooperation. They were directed to submit their recommendations to the management member of the special sub-committee. These directions were carried out. A representative group of experienced operating men in the industry assembled to advise with the management member of the special sub-committee on instructions. A comprehensive proposal embodying specific, practical and complete instruction as to interpretation and application of General Order No. 8 was developed.

First meeting of the special sub-committee was scheduled for May 25. On that day Murray indicated to the WMC chairman the unwillingness of the union to permit the matter of instructions under General Order No. 8 to be developed by the special sub-committee. Instead, he insisted that a five-man committee composed of union representatives meet with a five-man committee composed of industry representatives to negotiate the matter. Later it was decided that a committee composed of five union representatives would proceed with the three management members of the management-labor policy committee. This group met on May 26, 27 and 28 to consider various proposals regarding instructions for interpretation and application of General Order No. 8. These discussions ended in complete disagreement.

On May 29, the management members, together with representatives of the industry advisory committee met with the chairman of the WMC to urge his reasonable consideration of the industry's problems. An outline of the fundamental necessities of the instructions was filed in letter form.

It was held that the basic iron and steel industry should be distinguished clearly from manufacturing and fabricating; that executive personnel should not be subject to the order; that clerical help did not belong under Order No. 8; the orderly releases be provided for; that where production requirements in non-continuous mills did not permit 144 hr. per week exemptions be provided; that the term "workweek" must mean the generally scheduled workweek for groups of workers as contrasted with the actual workweek of an individual worker, and that when the 48-hr. workweek has been adopted in all departments where possible and appropriate steps are taken for exemption of departments where such workweek is not possible the order is fully complied with and the hiring control is inoperative.

• • • Reports covering the 48-hr. week and its effect on the steel industry have been printed in the news section of this magazine as follows: March 25, pp. 91-92; May 6, p. 97; May 13, p. 102; July 15, p. 102.

The instructions as to interpretation and application of Order No. 8 were issued by WMC on May 31. Whereas the instructions embodied practically all points that were urged by the union, in the main all recommendations of the industry were rejected, the review statement asserts.

On June 2, the iron and steel industry advisory committee transmitted to Mr. Batcheller a letter of immediate reaction to the instructions, and on June 9, filed with the WMC a petition for amendment of General Order No. 8 and the instructions. The amendments sought are those judged by qualified representative steel industry operating management to be the minimum changes that are essential if the industry is to operate under the order and do so without interference to or loss of vitally needed steel production. In brief:

1. Amend Sections V and VII of General Order No. 8 in such manner as to make the order say what it must mean, i.e. (a) That workweek means the scheduled workweek for groups of workers; and (b) That the hiring control is operative in establishments or departments only when such are not on the 48-hr. workweek or have not been exempted from the 48-hr. workweek.

2. Amend the instructions in such manner as to remove the requirement for regional directors to consult with management and the collective bargaining agency regarding release schedules, exemptions and authority to hire. If consultation must be had, confine it to the established WMC organization of management-labor war manpower committees.

3. Supplement the instructions in such manner as to:

(a) Make clear that the order covers the basic iron and steel industry as distinguished from establishments whose principal activity is manufacturing, fabricating, storing or distributing.

(b) Permit automatic exemption of non-continuous operations for short periods of time (30 days maximum) where failure to adopt the 48-hr. workweek is because of fluctuations beyond the control of the employer.

(c) Make it clear than when the employer converts to the 48-hr. workweek where possible, and applies for exemption when he cannot convert, he shall be judged to be in compliance with the order during pendency of his application or appeal thereon, and free from obstructive hiring control during that time.

(d) Permit the exemption of office and clerical workers in general mill offices the same as in executive, administrative and sales offices.

ENGINEERING CLINIC: At the Bureau of Reclamation laboratories in Denver a test specimen fails under a load of 2,000,000 lb., showing ample strength to withstand water pressure at the bottom of a reservoir several times as deep as the one which will be formed behind Shasta Dam, Cal.

Under date of June 24 the WMC chairman transmitted to the iron and steel industry advisory committee, a denial of the industry's petition for amendment of General Order No. 8 and the instructions.

In the denial, according to the review statement, it is stated that the industry's understandings as to definitions of the workweek and coverage of the order are correct. Further, the denial purports to reassure the industry that its apprehensions are unfounded.

The iron and steel industry advisory committee replied to the denial of its petition in a letter dated June 30, which is abstracted in the accompanying box. The reply sets forth regrets as to the denial; reaffirms a belief that the situation can be corrected only by modification of General Order No. 8 and the instructions; notes already conflicting interpretations among regional directors; reports loss of production due to manpower shortage in plants precluded from hiring; expresses intention of the industry to carry on in good faith under the Order; but holds that any loss of steel production as result of General Order No. 8 will rest solely upon the WMC.

Renegotiation of DPC Contracts Will Decrease Machine Tool Earnings

Washington

• • • **Troubled over** the prospect of a decade of depression caused by wartime overproduction, the machine tool industry now may also look forward to decreased profits this year as the result of the passage of an Act requiring the renegotiation of approximately $700,000,000 of DPC contracts.

Before the President signed the bill passed shortly before adjournment calling for DPC contract renegotiation, about half of the industry's annual output valued in 1942 at $1,300,000,000 was subject to renegotiation. Now, other gloomy predictions are based on industry estimates that 85 per cent of the $4,000,000,0000 worth of tools made for war will be suitable for civilian production and last about 20 years at the normal rate of use.

A brighter note, however, may be sounded when Congress acts to permit reasonable post-war reserves to be retained by the industry to tide it over the years when new machine tool demand does not keep pace with the post-war civilian demand for consumer goods. Prevailing Congressional opinion is that the House Naval Affairs Committee will favorably report such legislation at the next session.

But while Congress and some important procurement officials have said that they appreciate the industry's peculiar and precarious position when peace returns, the statement of Herbert J. Taylor of the War Department Price Adjustment Board before the Naval Affairs Committee impressed the legislators.

Mr. Taylor said that a financial analysis of a cross-section of the industry (19 companies who do 40 per cent of the industry's business volume) disclosed that the companies priced their aggregate product 47.5 per cent above cost.

"In our entire experience in examining American industry there are few industries which had the expansion in sales which the machine tool industry has enjoyed, and there is not a single sizeable industry in which the rate of profits to sales is as high as in the machine tool industry," Mr. Taylor declared.

Ralph E. Flanders, president of the Jones & Lamson Machine Co. and of Bryant Chucking Grinder Co., Springfield, Vt., told the Committee that he considered the allowance of one-third of his companies' net worth an adequate post-war reserve, the one-third to be deducted presumably from amounts which would otherwise be skimmed off by renegotiation and taxes.

Joseph L. Trecker, executive vice-president of the Kearney and Trecker Corp., Milwaukee, proposed three amendments to the renegotiation of the tax laws. They were:

1. The allowance of a deduction, for the purposes of determining the amount of excess profits for 1942 and years thereafter, of the unamortized cost of plant facilities at the year's end, acquired under certificates of necessity.

2. The allowance of a deduction of the cost of facilities acquired after 1942 in the current year in determining the amount of excess profits on current year's sales.

3. The payment of amounts realized from renegotiation in peak war years over 13 years, the assumed average life of a tool. Mr. Trecker thought it was unfair to take all excess profits from one or two years when machine tools are durable goods and have a long life.

Mr. Taylor's testimony sharply conflicted with that of the witnesses who represented the industry. He did not agree that the industry faces a post-war depression. Mr. Taylor contended that the industry's sales for the rest of the war would not drop below $500,000,000 annually, and pointed out that the National Machine Tool Builders' Association has said that 1943 business will drop from the 1942 peak of $1,300,000,000 to $1,000,000,000.

Mr. Flanders said that overall profits in the industry after taxes had plunged from 12 per cent in 1938 to 8 per cent after renegotiation. According to Mr. Taylor's record of the 19 companies, profits after taxes in 1942 amounted to 44 per cent of their net worth at the beginning of the year, and maintained that the industry had a 32 per cent profit margin per dollar of sales. Mr. Taylor said that the 44 per cent profit after taxes was more than four times higher than the net profits after taxes of 1336 manufacturing companies reported by the National City Bank. The profit of these companies was only 10.1 per cent of their net worth at the beginning of the year.

Mr. Flander's testimony showed that while the earnings permitted 33 machine tool companies which had been completely renegotiated were 25 per cent higher on the average than all other companies renegotiated, these earnings were not enough. He said that the history of the industry is one of deep valleys and sharp peaks. A greater reserve than allowed is necessary, he asserted.

Lend-Lease has destroyed the English market for machine tools, according to Mr. Flanders.

"There is no suggestion that Congress underwrite or subsidize the machine tool industry. It is, however, imperative to revive conditions that would make it possible for the machine tool industry to play its proper part in the future development of American industries," said Mr. Flanders.

The War Department Price Adjustment official, however, said that the Price Adjustment Board had concluded after thorough study that the machine tool industry does have peculiar problems of demand in the post-war period, "but study of these problems and all other factors convinces us that the industry is realizing excessive profits from its current production for war." Moreover, Mr. Taylor said that the pricing policies of the industry were such that it has not taken normal business risks.

Articles in the news section of this magazine covering the status of the machine tool industry have been published recently as follows: Feb. 18, p 109; April 15, p 102; April 22, p 84; May 27, p 128; June 10, p 110.

In his financial analysis of the experience of the Price Adjustment Boards investigation of the 19 companies, Mr. Taylor said that a comparison of balance sheets at the end of 1939, and at the end of 1942 indicates that the net working capital expanded from $35,500,000 to $57,100,000, an increase of $21,600,000.

"In addition to this," Mr. Taylor averred, "these companies have $12,600,000 of post-war tax credit which will become liquid funds in the period after the cessation of hostilities.

"The combination net working capital, and the post-war credit now amounts to $69,700,000, and compares with the net working capital of only $41,000,999 at the end of 1929.

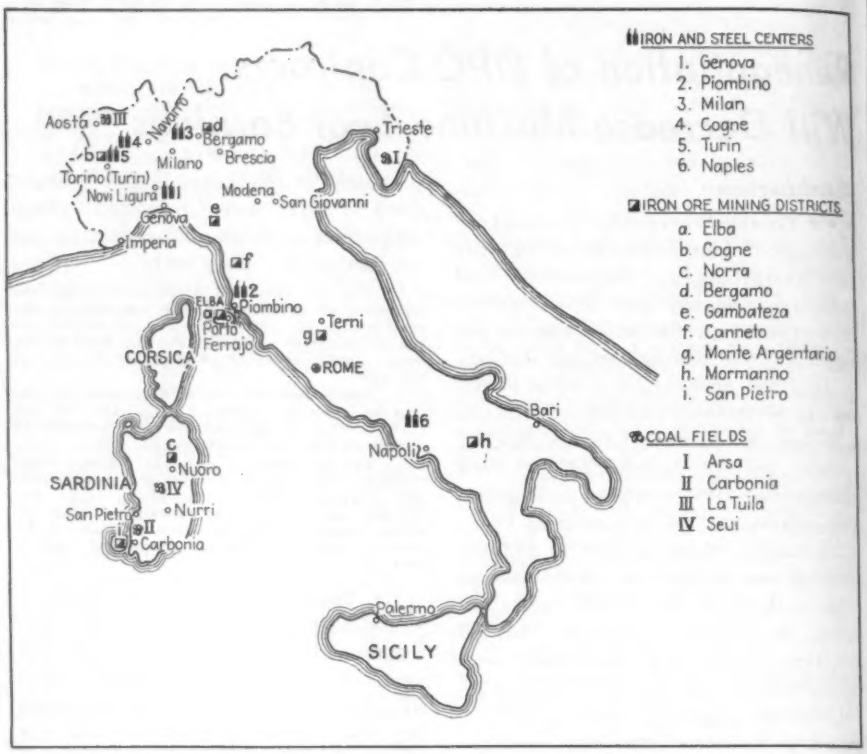
"A net sum of $15,500,000 has been invested in plants since the beginning of 1940, and $27,500,000 in miscellaneous assets," Mr. Taylor stated.

The following table submitted to the committee by Mr. Taylor shows the 19 companies' financial condition from 1930 to 1942:

(In thousands)

	Sales	Net Profit After Taxes	Dividends	Net Worth
5 years 30-34	$111,800	(d) $17,900	$5,000	$45,000
5 years 35-39	307,000	35,600	16,400	67,000
3 years 40-42	999,200	100,700	27,800	140,800

d = deficit.



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Allies Study Possibility of Using

By S. H. BARMASEL

• • • **Because Italy** soon may fall to the United Nations, it was the intention of the Board of Economic Warfare to keep where it is the bulk of the battle scrap that is now piled high in North Africa. When Italian furnaces cease working for the Axis, the scrap will be shipped across the Mediterranean.

Not much has been published about the iron and steel industry in Italy. Since 1938 no reliable statistics have been released. In that year production of steel ingots and castings totaled 2,554,000 net tons which was a rise of about 261,000 tons over the previous year's output and about 220,000 tons more than had been made in 1929. Italy's entire production is probably no larger than the annual capacity of either the Pittsburgh Works of Jones & Loughlin Steel Corp. or the Youngstown works of Carnegie-Illinois.

Large increases were made in electric furnace capacity, a necessary expansion to reduce the consumption of coke. These furnaces with an average daily capacity of 50 tons produced 770,000 tons of steel in 1938 or 30 per cent of the year's production. In 1929 only 232,000 tons of electric furnace steel was made.

Italy's most serious handicaps are its lack of coal and the high cost of pig iron but this had been partly overcome by the use of hydroelectric power and iron and steel scrap. Since 1938 when Mussolini approved the plan to reorganize the industry in order to achieve national self-sufficiency, efforts have been made to increase pig iron production to 1,650,000 net tons by the electric reduction of pyrite ash. Italy has large pyrite deposits which are mined for the production of H_2SO_4. About 10 per cent of the industry's needs is supplied by this method. Annual pyrite ash production averages 605,000 tons. Iron content is around 50 per cent.

In 1938 the number of blast furnaces with daily capacities of 200 to 300 tons totaled 14. Nine were in operation. The Societa Alti. Forni, e Acciaierie d'Italia owned 12 of the furnaces and the Societa Conge the remainder.

Another means to expand pig iron output set forth in the program was the search and subsequent development of new iron ore deposits. At that time domestic mine production supplied only 25 per cent of requirements. It was hoped by the plan to double ore output by 1940 by raising the

Steel Plants of Italy

Genova District

GENOVA
Societa Anonima Ansaldo (also at Corigliano)
Open hearth furnaces
Electric steel furnaces
Rolling mills
Ferriera di Bolzaneto Fratelli Bruzzo
Open hearth furnaces
Rolling mills

SAVONA
Societa Anonima Alti. Forni. e Acciaierie d' Italia (ILVA)
Basic open hearth furnaces
Rolling mills

IMPERIA
Societa Anonima Alti. Forni. e Acciaierie d' Italia (ILVA)
Open hearth furnaces
Rolling mills

BOLZANETO, LIGURIA
Societa Anonima Alti. Forni. e Acciaierie d' Italia (ILVA)
Open hearth furnaces
Rolling mills

VILLADOSSOLA, PIEDMONT
Societa Anonima Industriale Ceretti
Blast furnaces
Electric furnaces
Rolling mills

NOVI LIGURI
Societa Anonima Alti. Forni. e Acciaierie d' Italia (ILVA)
Open hearth
Rolling mills

SESTRE PONENTI
Societa Anonima
Alti. Forni. e Acciarierie d' Italia (ILVA)
Basic open hearth furnaces
Merchant, sheet and plate mills

PRA
Societa Anonima Alti. Forni. e Acciaierie d' Italia (ILVA)
Open hearth furnaces
Plate and merchant mills

VOLTRI
Societa Anonima Alti. Forni. e Acciaierie d' Italia (ILVA)
Open hearth furnaces
Rolling mills

SAN GIOVANNI, TUSCANY
Societa Anonima Alti. Forni. e Acciaierie d' Italia (ILVA)
Open hearth furnaces
Rolling mills
Ferriera di Bolzaneto Fatelli Bruzzo
Open hearth furnaces
Rolling mills

MODENA
Acciaerie e Terriere Societa Anonima
Steel ingots and castings

Piombino District

PIOMBINO
Societa La Magona d' Italia
Acid open hearth furnaces
Rolling mills
Tinplate bar mills
Sheet and tinplate mills
Societa Anonima Alti. Forni. e Acciaierie d' Italia (ILVA)
Blast furnaces
Open hearth furnaces
Rolling mills
Coke ovens

TERNI
Societa Anonima Per L'Industria e L'Electricita
Basic open hearth
Electric furnaces
Rolling mills
(Works at Papigno, Collestatte, Cervava, Naini, Galleto, Precl, Nera Montora and Spoleto).

PORTOFERRAIO
Societa Anonima Alti. Forni. e Acciaierie d' Italia (ILVA)
Blast furnaces
Bessemer converter

Milan District

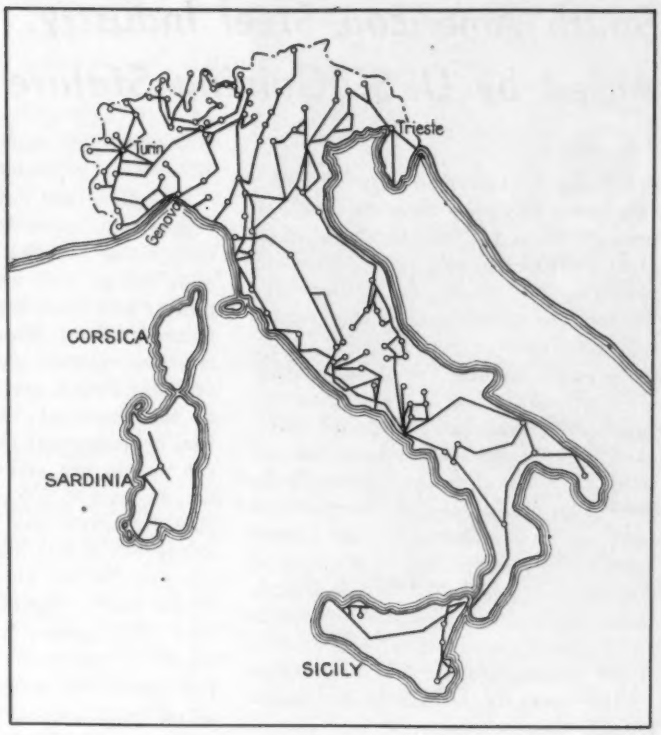
MILAN
Sesto San Giovanni

LEFT

● Italy's iron and steel industry is concentrated in three great works, at Bagnoli, Piombino and Genova. Societa ILVA controls the first two and the SIAC the last. While Italy has several production deposits of iron and manganese ores it has no important deposits of chromium, tungsten, nickel, molybdenum or vanadium.

RIGHT

● Mussolini's plans for autarchy included overcoming Italy's meager supply of coal by cheap hydro-electric power. This map shows the leading hydro-electric power stations and their connecting network of high transmission lines.



Italy's Steel Furnaces for Final Drive

Associate Editor

Elba mines output to 660,000 tons annually; Cogne in Val d' Aosta to 385,000 tons a year, and the mines of Val d' Aspra to 55,000 to 110,000 tons. The high phosphorus mines of Nurra in northern Sardinia were to be developed to produce 275,000 tons a year.

The ore mined in Elba by open pit methods is limonite with some hematite. Average analysis of this ore is 51 per cent iron, 10 per cent silica, 0.07 per cent phosphorus and 0.09 per cent sulphur. The ore is taken by aerial ropeways to the washing plants and then loaded onto ocean steamers. Ore recovery is reported about 60 per cent and annual production is about 440,000 tons. Together with the Val d' Aosta mines, these deposits yield 90 per cent of domestic output.

The Val d' Aosta deposit is mainly magnetite masses in serpentine. Ore from the Licioni mine, which is the main site of operations at 8000 ft. elevation is sent to the crushing and sorting plant at Cogne at 5000 ft. by means of a ropeway. From there it is sent by rail and ropeway to the blast furnace and steel plants at Aosta which are 1800 ft. above sea level. This deposit yields about 165,000 tons a year.

Other deposits are in the Nurra in northern Sardinia, in northern Italy, northeast of Bergamo; at Strettoia and at Boratti and at Fallonica.

The Nurra deposits are largely limonite containing 46 to 52 per cent iron and 10 to 15 per cent silica and siderite averaging 41 per cent iron and 6 per cent silica. This oolitic iron contains 0.8 per cent phosphorus and 0.2 per cent sulphur. Production there began in 1935 and by 1939 the annual yield was about 110,000 tons, the maximum tonnage of phosphorus ore the Thomas process (basic bessemer) could handle.

Expansion has also taken place in the production of manganese ore which totaled in 1939 about 55,000 tons for high grade ore and 22,000 for the low grade. The principal mines are located at Tre Monti and Gambatesa east of Genova producing 16,500 tons containing 48 per cent manganese, and at Mount Alpi and Mount Pre in Piedmont with an annual output of 5500 tons of 45 per cent ore. Dressing plants have been built at these mines as well as at the Mormanno, Mount Precila and San Palo Matese mines in southern Italy and on the island of San Pietro off the south coast of Sardinia.

Italy imports annually about 15

Steel Plants of Italy

Societa Anonima Acciaierie e Ferriere Lombarde Falck
Electric blast furnaces
Basic open hearth furnaces
Rolling mills

Vittoria
Rolling mills

(Rolling mills near Vobarno and Dongo)

Guisseppe e Fatello Redaelli
Open hearth furnaces
Electric furnaces
Rolling mills

Societa Anonima Elettrosiderugica della Valle Camonica
Special steels

Societa Anonima Italiana Acciai. Inossidabili Ing. M. Clerici
Special steels

VILLADOSSOLA, NOVARA

Metallurgra Vittorio Ossolana
Open hearth furnaces
Electric furnaces
Rolling mills

Brescia District

BRENO

"Alpi" Societa Legune Prodotti Elettrosi-Derurgici
Blast furnaces

Societa Anonima Stabilimenti di S. Eustacchio, Gia Franchi Griffin-Fanchi Gregorini
Blast furnaces
Open hearth furnaces
Rolling mills

Ferretti e Martin-Ferriera di Brescia
Blast furnaces

BERGAMO

Lovere
Societa Anonima Alti. Forni. e Acciaierie d' Italia (ILVA)
Open hearth furnaces
Rolling mills

DALMINE

Societa Anonima Stabilimenti di Dalmine

CREMA

Ferriera di Crema, P. Stramezzi & Co.
Merchant mills

AOSTA

Societa Anonima Acciaierie Ferriere Trafiliere Cravetto
Electric furnaces
Rolling mills

TURIN

Societa Anonima Nazionale Chuasso
Open hearth furnaces
Rolling mills

"Fiat" Ferriere Piemontesi
Open hearth furnaces
Electric furnaces
Rolling mills

NAPLES

Torre Annuziata
Societa Anonima Alti. Forni. e Acciaierie d' Italia (ILVA)
Open hearth furnaces
Rolling mills

BAGNOLI

Societa Anonima Alti. Forni. e Acciaierie d' Italia (ILVA)
(Ilva Works)
Blast furnaces
Open hearth furnaces
Blooming mills
Section mills

BARI

Societa Anonima Acciaierie e Ferriera Pugliesi
Steel ingots and shapes

TRIESTE

Servola
Societa Anonima Alti. Forni. e Acciaierie d' Italia (ILVA)
Blast furnaces
Open hearths
Rolling mills

Societa Anonima Weissenfels
Steel castings

million tons of coal from Germany and Poland. Domestic production averages only 1,980,000 tons a year. High grade coal comes from only two small groups of mines—La Tuille and Seui which produce less than 100,000 tons a year. Carbonia in Sardinia has some large deposits of lignite as does Arsa. These two areas yield 1,980,000 tons annually.

With so few natural resources, Italy has been forced to nurture the iron and steel industry with huge imports of scrap. Fifty per cent of the steel made in Italy is produced from scrap and half of this scrap is imported. Before the war, the United States was the main scrap supplier.

The plan for self-sufficiency also called for the erection of a new steel plant at Genoa by the Societa Italiana Accaieria Cornigliano (SIAC) with two blast furnaces of 500-ton daily capacity, coke ovens and rolling mills for steel products and alloys.

Italian Iron and Steel Production and Imports

Thousands of Net Tons

Commodity	1929	1938
Iron ore		
Production	786.5	1097
Net imports	210	425
Scrap iron imports	1094.5	664
Pyrite ash consumption	264	*
Pig iron		
Production	738	1021
Imports	196	76
Raw steel		
Production	2334	2554
Imports	44	15.8

*Unknown.

Imports from Spain increased substantially after the Franco victory in 1937. In 1939, the Italian Government contracted for 49,555 tons of iron ore from the Bilboa mines while pig iron imports from that country jumped from 1476 tons in 1937 to 50,050 tons in 1938. Italy got its metallic nickel from Norway (only 50 per cent of its needs could be supplied domestically) and its tungsten from Spain and Portugal.

The present trend shows an increase in electric furnace steel production since Italy is entirely dependent on imports for its supply of coking coal. But the current shortages of men and electric power have cut deeply into steel production. Last October it was reported that electric furnaces had been idle for several months. Imports of semi-finished steel from Germany have been increasing.

Several plant expansions have been made last year. The government was still optimistic then and according to K. Scheider in *Deutsche Volkswirtschaft* Italy was aiming at an ultimate output of 8 to 9 million tons of steel a year. Under present conditions, however, it is hard to believe that the Italian steel industry can operate at full capacity.

South American Steel Industry, Aided by U. S., Gaining Stature

Cleveland

• • • **South American** steel production never has been formidable, but if present plans for the development of steel facilities in the Latin American countries are developed, a long step toward self-sufficiency in this regard will have been achieved.

Foremost among the developments in South America is the American sponsored Brazilian National Steel Co., into which the Export-Import Bank at Washington has poured $45,000,000 in credits for the purchase of equipment and materials in the United States. The remainder of the cost of this plant will be borne by the Brazilian government, and the plant will in all likelihood be subsidized. The Office of the Coordinator of Inter-American Affairs recently disclosed that some 170,000 tons of material and equipment have been ordered in the U. S.

According to representatives of the Brazilian National Steel Co., here in Cleveland, about 80 per cent of the purchasing for this plant has been done, but actual deliveries of material and equipment have been low, approximating in volume only about 25 per cent of the ordered material. The coke oven batteries of this plant, as well as the blast furnace, are about completed, but the remaining mill equipment is either still in the process of fabrication or standing at American seaports awaiting shipment.

The Brazilian National Steel Co. originally was scheduled to go into operation in 1943, but present indications are that it will be late 1944 or 1945 before the plant is completed. The coke plant is a Koppers-Becker battery with a capacity of about 1000 tons a day, sufficient to handle 1000 tons of iron a day. The blast furnace, constructed by Arthur G. McKee & Co., is a 1000-ton furnace. Mesta Machine Co. is handling the construction of the blooming mill and a four-stand tandem cold mill, while United Engineering & Foundry Co. is building a plate mill that will be tied in with four stands of four-high mills for continuous sheet and strip production.

A hot dip tin plate line, with Wilson type annealing furnaces, is being built by Wean Engineering Co., Inc., and a structural and rail mill is being constructed either by Morgan Construction Co. or Mesta Machine Co. The open hearth furnaces were originally to be built by Brassert but later the contract was switched to Freyn Engineering Co., who will build six 100-ton basic furnaces.

The plant will have an annual ingot capacity of something in the neighborhood of 300,000 tons a year. Ore supplies, as well as supplies of manganese and limestone, will be obtained in the state of Minas Gerais, close to the new plant. Santa Catharina, a state in Brazil several hundred miles to the south of Volta Redonda, has coal deposits that are being developed for use in the steel plant. The coal will be barged 700 miles up the coast. The Brazilian coal deposits are low grade but it has been found they are suitable for use in steel making when mixed with higher grade imported coal. The present planned rolling capacity of the plant is all out of proportion to the steel making capacity, being approximately 100 per cent greater. This has been deemed advisable, however, as it is planned to add to the steelmaking capacity as fast as possible.

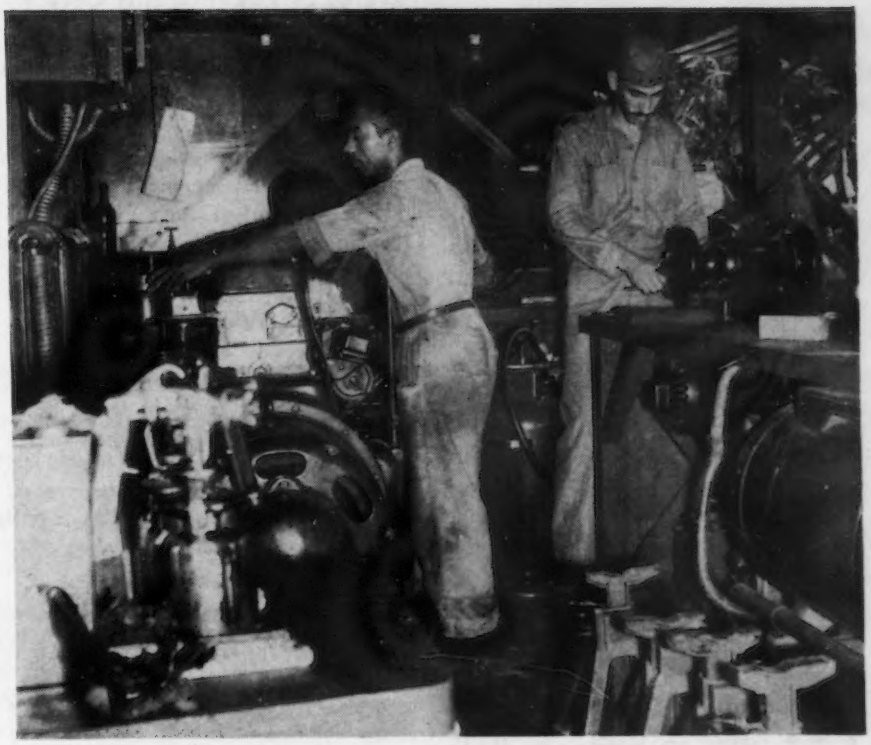
Second in importance to the National Steel Co. development in South America is the old established Brazilian steel producer, Siderurgica Belgo-Mineira, with plants located at Sabara and Monlevade, in Minas Gerais. At Sabara, where Belgo Mineira had its first plant, there are two blast furnaces with an annual capacity of 36,000 tons, three basic open hearth furnaces of 36,000 tons annual capacity, and a rolling mill that produces 36,000 tons of rounds, flats, angles and square bars with a maximum section of 3-in. There is proposed, but never likely to be built, two 85-ton blast furnaces, two 35-ton open hearths (or an annual capacity of 50,000 tons of pig iron and 55,000 tons of steel), as well as a complete rolling mill, with electrical equipment, heating furnace, transfer tables, cooling beds, and shears. The rolling mill equipment for this Brazilian plant was ordered in the United States, but delivery has not been made. Completed plans for the Monlevade plant call for an annual production of 150,000 tons of steel, to be used in the manufacture of 50,000 tons of rail, 50,000 tons of plain, galvanized and barbed wire, 26,000 tons of rounds, flats, small and heavy structurals, and 25,000 tons of pipe. This program will undoubtedly never be completed because of the construction of the new National Steel Co. plant.

Among the other developments steel-wise in South America that are proposed is a 100,000-tons-a-year elec-

tric furnace plant, costing about $5,000,000, planned for construction at Concepcion, Chile. Nucleus of this new plant will be the dismantled $200,000 rolling mill shipped to Concepcion recently from Delaware. The company, Corporacion de Fomento de la Produccion de Chile, expects to have the plant in operation by 1945, and will produce bars, sheets, and wire. Power will be supplied from 43,000 kw. Abanico hydro-electric plant about 100 miles from Concepcion. This is the largest of nine power plants now under construction by Chile Fomento, financed in part by Export-Import Bank loans.

Likewise, the construction of a rolling mill in Medellin, Colombia, is reported as nearing completion. The mill will have a capacity of 100 tons a day, with two electric furnaces for melting scrap, two gas furnaces for heating ingots, and roll stands for rods and small joists. Additional furnaces and rolling equipment for plates, wire and structural shapes are being considered. A blast furnace in the area is also being recommissioned for smelting ore on a small scale.

In addition, Argentina and Peru have undertaken small projects for developing steel production or have been studying possibilities for local projects. Peru has hopes of developing a steel industry at her growing industrial port of Chimbote to utilize nearby coal and iron deposits. Argentina has many small establishments producing steel from local sources of scrap and imported pig iron. Possibilities of organizing national steel production on a larger scale are being investigated.



IN NORTHEAST BRAZIL: In this mobile repair shop, Brazilians are being trained for vital roles in mechanized warfare.

There are two major factors that hamper steel production expansion in South America, one an immediate and passing factor, and the other a factor that probably will be the limiting influence on steel production in Latin America. The immediate holdup to steel plant expansion is the war. Most of the equipment for South American steel plants at present must be purchased in the United States, and because of the present acute supply situation on steel in this country there is little likelihood of any substantial amounts being sent to South America in the form of mill equipment.

The second factor, and by far the more serious, is the coal supply in South America. There have been repeated reports of good supplies of coal being found, but very little can be used without sweetening it with high grade imported coal.

Three-Way Struggle Over Civilian Goods Quotas To Be Settled By WPB

Washington

• • • **The controversy between** the Army, the Office of Civilian Requirements and the members of the WPB Requirements Committee over whether civilians shall have a minimum of consumers goods must be decided by WPB by the first week in August. At that time fourth quarter determinations will have been made by the committee. Forcing the decision is an OCR request for 143,000 tons of steel for fourth quarter civilian use. OCR is also preparing a report for transmission to War Mobilization Director Byrnes showing the relative demand and OCR's recommendations for various civilian items.

It is pointed out that while Army warehouses are bursting with consumers goods, the Senate Truman Committee has asked the Army for information regarding inventories. The Army is preparing to forestall criticism by declaring part of the goods surplus and making them available for civilian purchase, it is reliably reported.

The early success of the Italian venture plus public expectation that a forthcoming Truman report will condemn extravagant war buying promise to be factors in determining amounts of civilian goods to be made available.

OCR's request, if granted, means more metal ware for civilians by the first of the year. While the steel tonnage requested is considered minor by WPB officials tonnage-wise, at the same time it is deemed considerable for the manufacture of the items for which it is requested.

The metal products OCR is requesting materials for include:

Collapsible tubes; electric lamp bulbs and tubes; dry cell batteries; ice refrigerators; flashlight cases and portable electric lanterns; liquid fuel lamps; portable electric lamps (incandescent); cutlery; razors; razor blades; animal traps and cages; kitchen, household and other miscellaneous articles; office supplies; tacks and nails; low pressure cast iron heating boilers; cast iron radiators; cooking stoves and ranges; domestic heating stoves (excluding electric); warm air distribution equipment, registers, etc.; warm air furnaces; hot water heating equipment, including tanks; and screen cloth.

Seized Enemy Equipment Reaches U. S.

New York

• • • **Enemy equipment captured** in North Africa reached this country July 12 from the Ferryville scrap dump near Bizerte. All material was marked for the Aberdeen Proving Grounds where it will be examined and then sold for scrap. Included in this boatload were the first 88-mm. guns that were taken intact.

Some of the equipment brought over included a mobile crane weighing 12 tons, German half-track personnel carriers of about 10 tons, armored half-track trucks, Italian prime movers, ammunition carriers, field and aircraft rangers and field guns, from one-pounders to 5 in. The 13-ton turret of a Mark VI tank was also unloaded. The shipment also included four or five 50-ton German tanks and a German half-track motorcycle. There were about 35 pieces.

On the sides of a Mark VI tank were chalked the names of its captors: K. O. Gray, Boston; D. E. Reid; John J. Gregory, Jr., Jamaica, N. Y., and one other which was not clear.

A second ship carrying enemy shell cases, wing parts and other small equipment was also unloaded.

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Government Order Review Simplified

Washington

• • • **Issued on Monday by WPB,** amended Directive 23 is designed to simplify procedures for review of purchase orders of capital equipment and machine tools by the Army, Navy and other government agencies.

Principal changes brought about by the directive are these:

1. It restricts requirements for review of purchase orders for machine tools and capital equipment to those cases where the items included in the purchase order were not listed in the preference rating certificate which assigned the rating.

2. The definition of "command construction" formerly included only those construction projects such as air fields, military housing, depots, proving grounds and other passive defense projects which were ordered built by the Chief of Staff, United States Army or Chief of Naval Operations under contracts let by the Corps of Engineers or the Bureau of Yards and Docks. The latter contract requirements has been removed so that "command construction" now includes any of such projects which are built at the direction of the Chief of Staff, United States Army or the Chief of Naval Operations, United States Navy.

3. Capital equipment, not including machine tools, which are purchased for administrative use were formerly exempt from the review requirements when bought by, or for, the military. Now, any new capital equipment bought for administrative use is exempt from the screening process.

Those provisions which in the previous Directive 23 exempted from review certain PD-3A certificates are now, where appropriate, applied to exempt certain purchase orders also.

No Strikes?

• • • **Despite** union pledges and the anti-strike law walkouts during the last week included the following:

About 3000 insurgent coal miners in the Pittsburgh district lost most of the week.

Between 100 and 125 furnace men at the General Drop Forge plant of Brown-Lipe Gear Co. in Buffalo threw 500 workers into idleness for five days over a pay controversy.

An unannounced number of workers at Crucible Steel Casting Co. in Cleveland created a wildcat walkout holding up some operations for several days in a demand for higher wages.

A flash strike of Akron, Ohio, transportation workers (CIO) forced thousands of war workers to walk to work last week. This was the second walkout in two months.

New Bedford, Mass., felt the sting of a transportation tie-up when an AFL strike forced about 50,000 war workers to walk.

Bell Aircraft Corp., Buffalo, suffered a one-shift walkout of about 50 men.

About 50 CIO machinists stopped Bay City (Mich.) Shovels, Inc., for one day in a walkout strike. Vinco Corp. in Detroit had a one-day work stoppage. Forty-five foremen caused a four-day tie-up at the Ecorse plant of the Murray Corp. of America. Production was continued without supervision.

The Canton, Ohio, Steel & Tubes Division of Timken Roller Bearing Co. suffered a strike involving 350 workers in the rolling mills believed to be in protest of a changeover to the 48-hr. week.

A reduction in furnace tenders' bonuses caused a walkout of 60 workers in the American Magnesium Corp. in Cleveland, Alcoa subsidiary, tying up the entire force of 1000 other workers.

PIG IRON PRODUCTION in June fell to 4,786,944 net tons from 5,123,703 tons the previous month, according to the American Iron and Steel Institute figures. Had the rate of production continued in June about 170,000 additional tons would be made. Total output of ferroalloys dropped to 49,339 tons from 54,025 tons in May. For the first six months of the year pig iron output reached 30,343,443 tons compared with 29,430,871 tons produced during the same period last year. Although blast furnace capacity available for the first half of 1943 increased 1,553,775 tons over that of 1942, the increase in production amounted to only 912,572 tons.

	Pig Iron		Ferro Manganese and Spiegel		Total		
	Current Month	Year to Date	Current Month	Year to Date	Current Month	Year to Date	Percent of Capacity Current Month
Distribution by Districts:							
Eastern	931,825	5,584,567	14,830	124,844	946,655	5,709,411	89.4
Pittsburgh-Youngstown	1,909,493	12,453,041	17,952	112,602	1,927,445	12,565,643	91.0
Cleveland-Detroit	501,336	3,061,107	.....	.....	501,336	3,061,107	99.5
Chicago	1,071,283	6,452,409	.....	.....	1,071,283	6,452,409	99.5
Southern	308,039	2,012,336	12,359	99,946	320,398	2,112,282	88.0
Western	64,968	436,450	4,198	6,141	69,166	442,591	74.1
Total	4,786,944	29,999,910	49,339	343,533	4,836,383	30,343,443	92.8

During 1942 the companies included above represented 99.8% of the total blast furnace production.

Blast Furnace Starts at Edgar Thomson Works of C-I

• • • **A new unit,** designated as "C" blast furnace, was blown into production July 20 at the Carnegie-Illinois Steel Corp. Edgar Thomson Works. Elected for the government's Defense Plant Corp., it has a daily rated capacity of 1330 net tons of pig iron. Operating at capacity, it will consume 5500 tons of iron ore, coke and limestone every day.

A turbo-blower capable of supplying 90,000 cu. ft. of air per minute at 30 lb. pressure provides the blast for the big stack.

Railroads May Ask Steel of Services

Pittsburgh

• • • **If the railroads** are unable to get the number of cars and locomotives which they believe are necessary to keep the transportation system from falling apart, some roads may attempt to get the Army and Navy to include railroad needs under their own requirements on the basis that Army and Navy requirements get the best attention. That was the gist of reports reaching here as some railroad men saw a slight improvement in the locomotive and freight car picture.

Third and fourth quarter estimates on freight car allocations which involve several thousand for Russia amount to approximately 23,325 freight cars. Of this total slightly more than 11,000, involving different types of cars to be built in the last two quarters of this year, are slated for Russia. Approximately 2100 cars, including sleepers, flats, and kitchen cars, have been allocated for the Army. Domestic car allotments for the fourth quarter are estimated at 10,175. Aside from the above allocations, it is understood that the Army will take about 27,000 freight cars during the fourth quarter of this year and the first quarter of next year. Since material for this equipment is under CMP, construction is assured. The allotment of 20,000 domestic freight cars for the first six months of this year is expected to be completed by November or December.

o o o

Cabot Resigns Salvage Directorship

Washington

• • • **Paul C. Cabot,** director of the WPB Salvage Division, has sent a letter of resignation to Donald M. Nelson, chairman, asking that he be relieved of duty by Sept. 1. Mr. Cabot stated that an ear operation recently performed and another impending forced him to seek rest and doctors' care. Mr. Cabot became director of the division following the resignation of Lessing J. Rosenwald.

Allotments Approved To Replace Inventories

Washington

• • • **To avoid production** delays a manufacturer may use an allotment to replace in inventory the controlled materials used to manufacture the product for which the allotment was originally made. According to interpretation No. 11 to CMP Regulation No. 1, announced by WPB, July 19, the quarter for which an allotment is made and the quarter in which delivery of a Class A product is to be made need not be the same.

Lukens Workers Pledge Steel

LUKENS STEEL CO., Coatesville, Pa., rallied to a visitation from WPB last week and pledged even greater production to assist the "Steel for Victory" drive. WPB's C. E. Wilson (above) told Lukens workers, "Don't believe stories that the Army and Navy have more of some things than they need." H. G. Batcheller said the most critical shortage was plates. Workers, spoken for by Robert W. Wolcott, Lukens' president (right) cited quadrupled production from 1939 to 1942 and a 25 per cent increase this year. The visitors included labor members of WPB and the chief of the War Production Drive.

Special Allotments for Class A Products May Evade Army Authority

Washington

• • • **Manufacturers of Class A products** who are remote from their prime contractors may obtain special allotments hereafter by making direct application to WPB for their materials, WPB announced on July 14 in Direction 22 to CMP Regulation No. 1.

The reason for this provision, WPB says, is that the remote concerns have not been getting their allotments quickly enough to keep in step with scheduled programs. Some WPB officials look upon the move as a WPB attempt to circumvent the Army's grab for authority over all Class A products except 22 classifications. (See THE IRON AGE, July 8, page 114b.)

The procedure says that manufacturers who receive special allotments must obtain allotments from his customers covering the controlled materials before a product may be delivered. Prior to the sixth day of each month, allotments received from customers covering controlled materials for which special allotments have been made must be returned to the Claimant Agency or Industry Division which made the special allotment.

To apply for a special allotment, a manufacturer must:

1. File Form CMP-4B, according to instructions which are spelled out in Section (b) of Direction No. 22 to CMP Regulation No. 1.

2. Describe in a letter covering the CMP-4B application, the extraordinary circumstances and urgency of need for the allotment, showing that failure to receive it will cause an interruption of production. This letter must also show that the applicant has made a diligent effort to obtain allotments from his customers and has been unable to do so.

The use of special allotments will be subject to special conditions. These will be set out in a letter of transmittal, which will accompany Form CMPL-150, the instrument on which special allotments will be made. Among the conditions will be the following:

1. A consumer receiving special allotments must not use allotments received from customer to purchase controlled materials when a special allotment has been received.

2. Authorized controlled material orders placed, or allotments made, on the basis of allotments received from customers (including SO orders received) prior to receiving the specific allotment, need not be changed, but the customer receiving the special allotment must deduct from it the quantity of such order and allotments for the same quarter.

3. Manufacturers who have received special allotments must not deliver Class A products made from controlled materials covered by the special allotment to any customer, unless the customer furnishes the manufacturer with an allotment and an authorized production schedule.

4. Consumers receiving special allotments must return allotments received from their customers, not later than the 5th day of each month following receipt of a special allotment, to the claimant agency or industry division.

Price Briefs

• Amendment 1 to Order A-2 of Max. Price Reg. 188 modifies the adjustment provisions for maximum prices of ladle brick.

•

• Amendment 1 to Max. Price Reg. 413 provides that manufacturers' shipments of hinges and butt hinges into Kansas, Nebraska, North Dakota and South Dakota are to be priced on an f.o.b. and not a free freight basis. (Release No. TCS-437)

•

• Amendment 3 to Max. Price Reg. 258 provides that buyers of chrome ores may be charged transportation from unloading docks to users' plants in basing point cities. (Release No. TCS-439)

•

• Amendment 7 to Revised Price Schedule 41 (steel castings) provides that quantity differentials shall be applicable to prices on the basis of quantities of castings ordered from one pattern at one time and scheduled for delivery in any one calendar month. (Release No. TCS-447)

•

• Amendment 8 to Max. Price Reg. 246 allows manufacturers of farm equipment parts to add emergency service charges to their ceiling prices. (Release No. TCS-498)

Fabricated Pipe for Navy Is Class A Product; Otherwise B

Washington

• • • **Fabricators of steel** and wrought iron pipe were notified last week that they would receive steel allotments from both the WPB and the Navy. This was brought about by the declaration of fabricated pipe as an A product—for the Navy only. Hence, allotments for fabricated pipe for customers other than the Navy will follow the usual B product course while the Navy must extend allotments separately for their requirements.

Turbines Scheduled By M-76

Washington

• • • **WPB last Thursday** announced minor changes in Order M-76, which sets up a scheduling procedure for the manufacture of land turbines, turbine-generators sets and generators. The changes bring the order in conformity with the general WPB procedure for the scheduling of component parts.

Priority Changes

L-54-c—Order effects a change in the production policy governing certain types of office machinery whereby production will be on a continuing basis to meet WPB-approved orders and to provide for the maintenance of a maximum 90-day inventory. (7-14-43)

•

L-97—Amendment 1 provides that the Transportation Equipment Division will undertake the scheduling of all locomotives of 20 tons or under, which are to be used in above-ground mining operations. (7-17-43)

•

L-112—Amended order requires that purchase orders for used industrial power trucks be authorized by the WPB before they can be accepted. (7-12-43)

•

L-112-a—Amended order names additional manufacturers of industrial power trucks on the list of those who make models which are approved by WPB and come within the provisions of L-112. (7-12-43)

•

L-123—Int. 3 provides that the sale of a fractional horsepower motor to replace one broken down is considered a maintenance and repair transaction, where the broken one is taken in by the repairer. (7-14-43)

•

L-157—Schedule V, as amended, exempts hand eye hoes manufactured for export under license or to fill Lend-Lease orders from the restrictions on patterns, sizes and weight established by the hand tools simplification order. (7-13-43)

•

L-173—Amended order eases restrictions on the production of space heaters. Gas heaters may be manufactured without restriction except for limitations provided in L-23-c. (7-13-43)

•

L-197—Amended order removes restrictions which prohibited the use of new or used steel drums for packing 16 chemical products. (7-14-43)

•

L-201—Amended order establishes the quantities of automotive and tractor tire chains and chain parts which may be produced from April 1, 1943, through March 31, 1944. (7-14-43)

•

L-203—Int. 1 holds that only the Army and Navy may order non-standard valves, and those only when specified by the Army or Navy and intended for their use. (7-12-43)

•

L-214—Schedule 3 establishes simplified practices and controls with regard to medical and surgical furniture. (7-13-43)

•

L-257—Amended order authorizes continuation of the material quota for farm equipment previously authorized by appeal under L-170. (7-14-43)

•

L-272—Int. 1 prohibits the manufacture of non-standard items except where required by specifications of a claimant. This exception applies only if "the particular service or agency has actually specified use of the specification in the first instance." (7-12-43)

•

L-292—Amendment 2 revises the definition of "approved orders" to include orders bearing a rating of AA-3 or higher on Form WPB-837. (7-17-43)

•

M-11-1—Amended order allows any producer or dealer to ship and deliver small quantities of zinc dust to any other person without an allocation certificate. (7-13-43)

•

M-61—Amended order provides a more simplified method of procuring authorization for the manufacture of strategic graphite articles other than crucibles. (7-17-43)

•

M-76—Amended order sets up a scheduling procedure for the manufacture of land turbines, turbine-generator sets and generators so as to bring the order into conformity with the general WPB procedure for the scheduling of component parts. (7-15-43)

•

M-255—Amended order places sales of rejected new steel drums and seconds under control of the WPB. (7-17-43)

How many machine tool operations help to arm these

gods of the upper air . . .

Into a single engine of the planes they fly, go thousands of individual manufacturing operations . . . to accuracies measured in thousandths, ten thousandths or even millionths of an inch.

The power of a single turret gun is the sum of a dozen engineering sciences and a hundred skills.

Even the breath of life itself, to these gods of the upper air, is the product of many machines.

And of all the complex, intricate and wonderful tools in use by the aviation industry, none is more basic or more vital to production than the precision internal grinding machine.

BRYANT

BRYANT CHUCKING GRINDER COMPANY

SPRINGFIELD, VERMONT, U. S. A.

Two Revisions Affect Freight Costs for Iron and Steel Warehouses

Washington

• • • **Warehousemen and** jobbers on sales of iron and steel products when the buyer has specified special delivery service may pass on to the buyer actual special delivery service charges less than normal freight from shipping point to destination, OPA announced July 14.

Special delivery services are defined as shipments by railway express, air express or parcel post.

If the special delivery service charge is cheaper than normal freight, however, the difference between the special delivery charge and normal freight must be deducted from the maximum delivered price for the shipment.

This change in computing transportation charges is made in Amendment No. 17 to RPS No. 49, and becomes effective July 20.

In another pricing revision, Amendment No. 17 authorizes warehousemen and jobbers to use freight rates applicable to l.c.l. shipments in computting freight charges on mixed carload shipments of iron and steel products within their normal marketing areas.

Under the schedule, the mixed carload price is computed by making a specifically-provided deduction from the 500 lb. quantity price. Previously, when freight was one of the elements used in determining the 500 lb. quantity price, the schedule required that carload freight be used for mixed carloads in every instance.

Under the amendment, freight rates applicable to l.c.l. shipments now may be used in mixed carload shipments except for the additional freight charge permitted in sales beyond the seller's normal marketing area. The additional charge must be based upon the carload rate.

Sales beyond the normal marketing area include shipments of dislocated tonnage, shipments from one OPA zone to another, shipments between zoned and non-zoned areas, and shipments within a zone where maximum freight absorption provisions are applicable to l.c.l. shipments on mixed carload shipments within the seller's normal marketing area is in conformity with industry practice on April 16, 1941, base pricing date of the schedule, OPA said.

MRO Ratings Permitted For Employee Tool Purchases

Washington

• • • **Employees will be** permitted, under specific circumstances, to use CMP Regulation No. 5 preference ratings assigned to their employers for MRO supplies, to purchase hand tools that they require to retain or obtain employment, WPB announced.

At the same time, WPB is permitting employers to purchase such items as hand tools for resale to employees, although this has not been a customary business practice in the past.

If the employer is unwilling or unable to (1) buy the necessary tools for himself and check them out to his employees, or (2) purchase tools for resale to employees, an employee may use his employer's MRO preference rating to purchase tools (including gages and engineering instruments) which he requires for use exclusively in his employer's business and which his employer requires him to furnish. The rating will be valid only if the employee gives the seller of the tool a certificate filled out and signd by his empoyer and himself.

Chrome Buyers to Pay Freight Charges From Dock

Washington

• • • **Buyers of chrome ores** may be charged transportation from unloading docks to users' plants in basing point cities, the OPA announced July 14.

OPA said, however, that the transportation charge from dock to plant may not exceed switching charges from dock to plant.

To make this point clear, Amendment No. 3 to Maximum Price Regulation No. 258 has been issued. The Amendment becomes effective July 20, 1943.

Drum Use Broadened

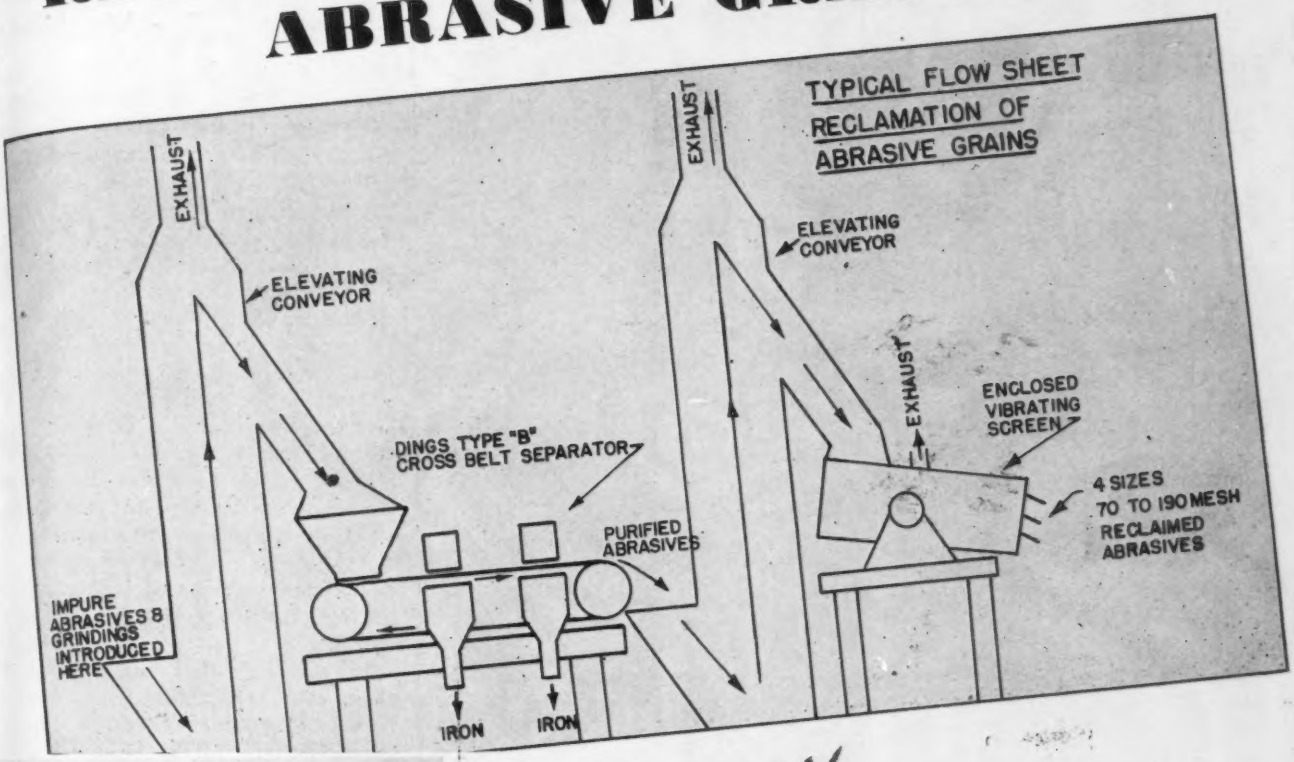
• • • **Restrictions which** prohibited the use of new or used steel drums for packing 16 chemical products were removed last week by WBP.

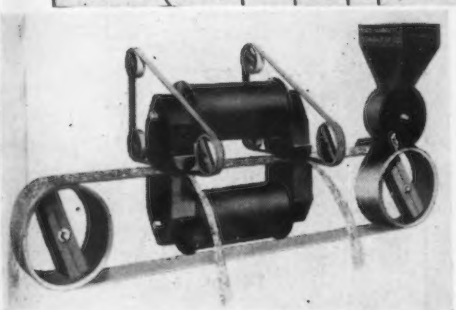
The action was taken under the terms of Limitation Order L-197, as amended. It was necessary because satisfactory substitutes were either not available or not available in sufficient quantity.

Wide World Photo, San Francisco Bureau

MOTOR DEPOT: This fighting equipment for the men of the United Nations is awaiting shipment from the Richmond Tank Depot in California.

RECLAIM ABRASIVE GRAINS





PRINCIPLE OF OPERATION OF DINGS CROSS BELT SEPARATOR

Material to be purified is carried on a belt under a series of highly intensified magnetic zones. Magnetic material is attracted upward to the under surface of the cross belts which carry it to the side beyond the magnetic influence, where it is discharged. Non-magnetic material is discharged at the end of the main belt.

The intensity of each magnetic zone can be controlled independently so that materials of varying magnetic susceptibilities can be separated from each other. These units can be built with as many zones and cross belts as desired.

with DINGS MAGNETIC SEPARATORS

THAT abrasive grains can be practically and profitably reclaimed has been demonstrated by a number of large plants using Dings Magnetic Separators.

The flow sheet illustrated is being used by a middle-western plant which is reclaiming approximately 1500 lbs. of grain per day. Sweepings are collected from both rough and finish grinding operations and are found to average approximately 15% iron and 85% abrasive. The reclaimed grain is mixed with virgin grain, in a ratio of 1/3 reclaimed to 2/3 new, to make rough grinding wheels only. These have been found entirely satisfactory, comparing favorably with those using all new abrasive. The entire installation paid for itself in a relatively short time.

For full details on Dings equipment for any reclamation job, write today.

Dings MAGNETIC SEPARATION HIGH INTENSITY

DINGS MAGNETIC SEPARATOR COMPANY
516 E. SMITH STREET • MILWAUKEE, WISCONSIN
World's Largest Exclusive Builder of Magnetic Equipment

quality BUILT IN!

"BARBER-COLMAN" Type "V" Hobbing Machine . . . Bijur Lubricated.

The correct oil film to each individual bearing... *automatically*

Machine accuracy is maintained at maximum by Bijur lubrication. This centralized forced-feed system promotes better-quality work . . . higher speeds . . . bigger production at lower cost . . . longer-lived machines. Each bearing is fed *automatically*—the exact, metered oil-film demanded by its size, speed, load. Bijur lubrication is engineered to modern machine standards!

BIJUR LUBRICATING CORPORATION • LONG ISLAND CITY, NEW YORK

BIJUR

AUTOMATICALLY *Correct* LUBRICATION

NEWS OF INDUSTRY

New Policy Set On Office Machinery

Washington

• • • **A change in the** production policy governing certain types of office machinery was announced July 14 by WPB. Under the new plan, production will be on a continuing basis to meet WPB-approved orders and to provide for the maintenance of a maximum 90-day inventory.

As a result of the new policy—established by amendment of Order L-54-c, manufacturers are now limited in their output to a quantity sufficient to meet orders on hand authorized on Forms WPB-1688 and WPB-2798. In any case, they are allowed to maintain inventories not to exceed the total dollar value of sales of machinery to their customers on approved orders plus exports of sets of parts during the preceding 3 calendar months.

In addition, they are limited in their total production of permitted parts and machinery during the 19-month period beginning June 1, 1942 and ending December 31, 1943.

Tire Chain Quotas Set

• • • **The quantities of** automotive and tractor tire chains and chain parts which may be produced from April 1, 1943 through March 31, 1944 have been established by an amendment July 14 of Limitation Order L-201.

Under the amendment, manufacturers of automotive tire chain are permitted to produce the quantity allowed by the order without regard for any other orders bearing higher preference ratings. However, manufacturers must fill AAA rated orders first.

★WPB ORDER M-24C REQUIRES YOU TO

Classify Scrap at the Source-

SEGREGATE INTO THESE OFFICIAL CLASSIFICATIONS:

1. Nickel Steels (Ni 1%-2%) and Nickel-Chromium Steels (Ni 1%-2.25%) as 2100, 3100, 3200 series
2. Nickel Steels (Ni 2%-5.25%) as 2300, 2500
3. Nickel-Chromium Steels (Ni 2.25-5.25%) as 3300, 3400
4. Nickel-Molybdenum Steels (Ni 1-5.25%) as 46-4800
5. Ni Cr Moly Steels (Ni 1% and under) as 86-87-88-8900
6. Ni Cr Moly Steels (Ni 1%-5.25%) as 4300
7. Molybdenum Steels (Moly 0.15-0.65%) as 4000, 4100, 80-81-82-83-84-8500
8. Molybdenum Steels (Moly over 0.65%) as Mn-Mo Bullet Core
9. Chromium Steels and Chromium-Vanadium Steels (Cr 0.70-1.75%) as 52100-5100-6100

TOOL STEELS 10. Class A High Speed Steels (containing [1] at least 0.60% carbon and 3.0% Moly or [2] at least 0.60% carbon, not over 7.0% tungsten and at least 3.0% molybdenum) 11. Class B High Speed Steels (at least 0.55% carbon and 12% tungsten 12. Tungsten-bearing Hot Work Steels

CORROSION AND HEAT RESISTING 13. Chromium 10-14% inclusive 14. Chromium 15-18% incl. 15. Chromium over 18%. 16. Chromium 16-20% incl. and Nickel 8-10% incl. 17. Chromium 21-30% inclusive. Nickel 11-20% inclusive. 18. All other grades of corrosion and heat resisting alloy irons and steels containing chromium, nickel, molybdenum, cobalt, or copper.

Segregating scrap, as required under WPB Order M 24 C, is a difficult task, but it is absolutely necessary — there is no alternative. Production of fighting equipment made from alloy steels must not bog down.

War has shut the door on many sources of supply for essential elements, such as chromium, vanadium, nickel, which put the "fight" in steel. As a result, most of the alloys must be redeemed from the steel itself. For instance, in the manufacture of a precision part of an airplane, only 20 per cent of the original steel ingot is actually used. The other 80 per cent becomes scrap in the form of turnings and other by-products of the various machining and finishing operations.

Recovery of the essential alloys from machine turnings, chips, etc., would be comparatively simple if the elements could be separated in the furnace, but this is impossible. Scrap of unknown analysis may not only mean waste or loss of the alloys, but may ruin an entire heat of steel. Properly classified scrap saves alloying materials as well as manufacturing time.

To make enough alloy steel for the demands of war, scrap must be segregated and identified by the specific classifications outlined by the War Production Board. The only way this job can be done is at the source—your machines where the scrap turnings are produced. If you have not already done so, we urge you to review your shop procedure on the handling of scrap.

COPPERWELD STEEL COMPANY WARREN, OHIO

AIRCRAFT QUALITY STEELS · NITRALLOY STEELS
STAINLESS STEELS · BEARING QUALITY STEELS
CARBON TOOL STEELS · ALLOY TOOL STEELS

Adjustable Pricing Made Uniform

Washington

• • • **Embodied** in GMPR by Amendment No. 57, provisions have been adopted by OPA for adjustable pricing governed by uniform, agency-wide provisions recently applied to other regulations. Under these uniform provisions, any person may agree to sell at a price which can be increased up to the maximum price in effect at the time of delivery; but no person may, unless first specifically authorized by OPA, deliver or agree to deliver at prices to be adjusted upward in accordance with action by OPA after delivery.

Such authorization may be given by OPA when a request for a change in the applicable maximum price is pending and will be given only if the authorization is necessary to promote distribution or production and if it will not interfere with the purposes of the Price Control Act.

U. S. Reopens Old Corundum Deposits

Washington

• • • **For the first time since World War I, the United States has begun to produce corundum. The supply available in the new operation may amount to as much as a quarter of America's total current consumption. The new corundum mining is being undertaken at a recently reopened deposit in South Carolina by Withers, Inc., under a contract with the Metals Reserve Co.**

War Conference Display To Feature Metal Congress

• • • **Plans** for the twenty-fifth annual National Metal Congress in Chicago the week of Oct. 18, were announced this week by W. H. Eisenman, managing director of the meeting and national secretary of the American Society for Metals.

With completion of final arrangements for a war conference display as one of the outstanding features of the meeting, Mr. Eisenman pointed out that all activities would be concentrated in the Palmer House and other Chicago hotels. The entire Metal Congress and conference displays will be tuned to the increase of war production in the metal industry, to the conservation of metals and to postwar planning. All technical sessions and special daily war production and conservation sessions will be streamlined and comprehensive in their contributions to the war problems. Production problems involving shortages of strategic metals, more efficient use of equipment, and continued training of personnel will be dealt with.

The American Society for Metals, the American Welding Society, the Wire Association and the iron and steel and metals divisions of the American Institute of Mining and Metallurgical Engineers will participate.

ASM sessions will be concentrated in the Palmer House, with the American Welding Society at the Morrison Hotel, the Wire Association at the LaSalle, and the A.I.M.E. at the Sherman.

War conference displays will be located in the special rooms designed for light displays in the Palmer House. Far different from anything in the past, these rooms will accommodate light equipment and metal parts.

REDUCE

CHECKING DETAIL AND AVOID

DELAYS

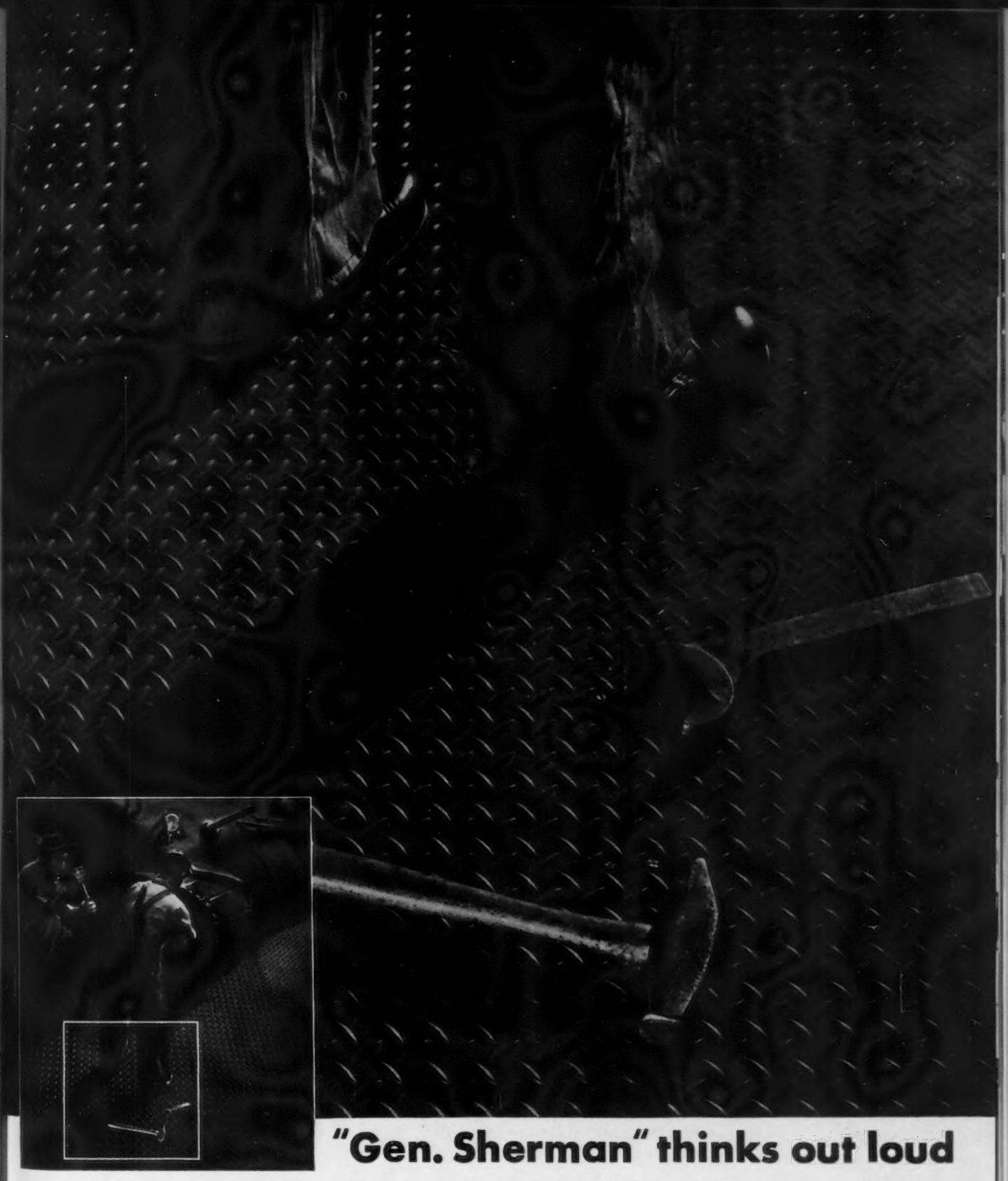
In checking some forgings for uniformity of physical structure, it may be practical to check one and pass nine. But without confidence in the merit of forgings produced by a particular supplier, this might be unsafe. It is not unusual to check ten, and pass ten T & W Forgings for uniformity of physical structure. This builds confidence that permits reduction in checking detail and avoids delays. Experience, plus strict adherence to a prescribed procedure for heat treating forgings, produces the desired specified results. Heat treating T & W Forgings is a straight forward production process that obtains uniformity in the exact degree desired. Ask a T & W forging engineer about uniformity in physical structure of forgings.

T & W FORGINGS USUALLY COST LESS AT THE POINT OF ASSEMBLY

TRANSUE & WILLIAMS

STEEL FORGING CORPORATION · ALLIANCE, OHIO

Sales Offices in New York, Philadelphia, Chicago, Indianapolis, Detroit and Cleveland



"Gen. Sherman" thinks out loud

Coming down the assembly line on "A.W." Rolled Steel Floor Plate, a General Sherman tank has plenty of time to "think"—about tough floors that withstand punishing hours of wear to keep war production rolling . . . about safe floors that prevent costly falling accidents. "A.W." Floor Plate is essential in war plants, refineries, railroads and on shipboard. Folder on request.

Other products include Plates, Sheets, Billets, Blooms, Slabs—Carbon, Copper or Alloy analyses.

ALAN WOOD STEEL COMPANY

MAIN OFFICE AND MILLS: CONSHOHOCKEN, PENNSYLVANIA : SINCE 1826. District Offices and Representatives: Philadelphia, New York, Boston, Atlanta, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, Houston, St. Paul, New Orleans, Pittsburgh, Roanoke, Sanford, N. C., St. Louis, Los Angeles, San Francisco, Seattle, Montreal.

Overlap Affects Casting Differentials

Washington

• • • **Quantity differentials** applicable to maximum prices for steel castings were revised by the OPA last week to meet changed conditions in production and deliveries.

Under Amendment No. 7 to RPS No. 41 effective July 20, quantity differentials shall be applicable to prices on the basis of quantities of castings ordered from one pattern at one time and scheduled for delivery in any one calendar month.

The one exception to this rule is where a production run overlaps a calendar month. In this case, the quantity differential is to be determined on the basis of the quantity produced on the run.

Do You Know That---

There's a special Wyandotte Metal Cleaner for the anodic cleaning of bearings prior to silver deposition?

This special Wyandotte Product *contains no silicate,* rapidly removes carbon smut, and is free rinsing. Users tell us "that it leaves an ideal surface for silver strike."

Details regarding the use of this Wyandotte Product for cleaning prior to plating silver on bearings will be sent to you promptly.

There is a specialized Wyandotte Metal Cleaning and Degreasing Product for every war production metal cleaning job. Located near you is a Wyandotte Field Engineer with a wealth of "know how" about metal cleaning, that is yours for the asking.

WYANDOTTE CHEMICALS CORPORATION
J. B. FORD DIVISION — WYANDOTTE, MICH.

SERVICE REPRESENTATIVES IN 88 CITIES

* Wyandotte Chemicals Corporation consolidates the resources and facilities of Michigan Alkali Company and the J. B. Ford Company to better serve the nation's war and post-war needs.

Company Produces Steak—and Trimmings

Columbus, Ohio

• • • **A thick steak is no novelty to employees of the Denison Engineering Co.'s war plants here—the company produces its own.**

Under a unique arrangement, products of seven company-owned farms stocked with cows, cattle, sheep, lambs, hogs and chickens, and with 700 acres in cultivation, are made available to employees for both work and home nutritional needs at below average cost.

The "grow - our - own" farm project was conceived last January by W. C. Denison, Jr., president of the Engineering Research Co., who then bought available farm lands in the vicinity of his factories and erected housing facilities for farm labor.

At Middletown, Ohio, some 250 employees of the American Rolling Mill Co.'s plants responded when a call came recently from farmers in the surrounding area requesting help in getting in corn crops which had been delayed to the last minute by wet weather. After completing an 8-hr. shift in the mill, the steel workers went to work on the farms in the late afternoon and toiled until it was so dark they could no longer see. Due to their immediate and wholehearted response, a substantial portion of the corn crop is expected to be harvested this Fall.

100-Octane Program Gets AA-1 Greenlight

Washington

• • • **Action by the WBP** in granting a higher priority rating for the 100-octane aviation gasoline plants that are scheduled for completion in 1943 was hailed by Acting Petroleum Administrator for War Ralph K. Davies as "a great help." WPB raised the priority for a number of plants from AA-2X to AA-1.

Medical Furniture Limited

Washington

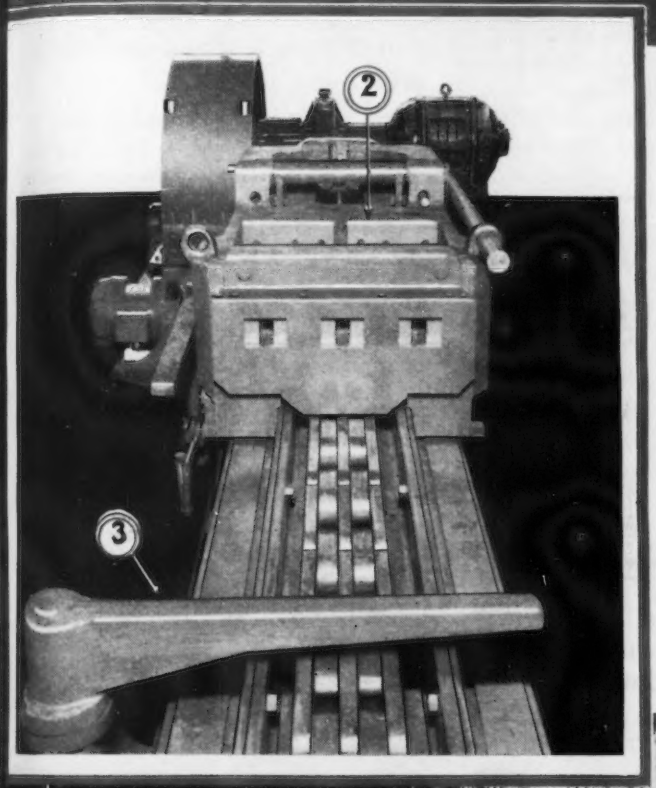
• • • **Models of surgical,** medical, and related furniture are listed by WPB in Schedule 3 to Order L-214, issued June 13 which establishes simplified practices. It prohibits the use of critical metals in such equipment other than those named on List A., attached to the schedule and limits the number of models of each item that may be produced.

McKAY

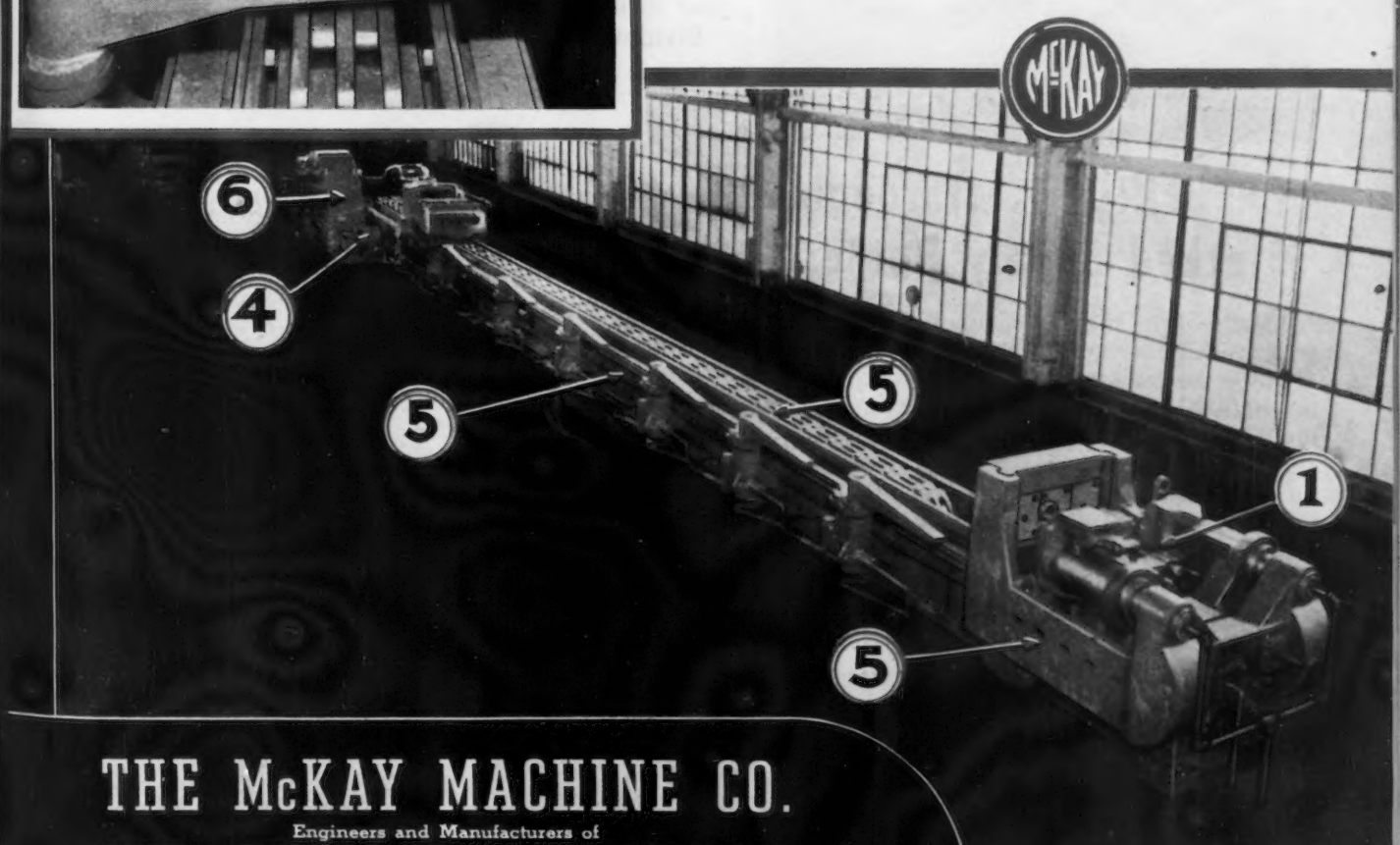
BAR DRAWBENCHES

(WITH OR WITHOUT)

PUSH POINTERS



1. Hydraulic push pointer. (Insures lower maintenance cost)
2. Automatic wedge type grip-buggy for single and multiple draw with quick change feature.
3. Hydraulic or pneumatic throw-off arm.
4. Hi-speed automatic grip-return with slow pull-in feature.
5. Steel construction throughout.
6. Constant or variable speed drive.



THE McKAY MACHINE CO.

Engineers and Manufacturers of

SHEET, TIN AND STRIP MILL EQUIPMENT

YOUNGSTOWN, OHIO

Patents Pending

We also build: TUBE DRAWBENCHES, BAR SHEARS and ROTARY POINTERS

25% Bearing Production Increase Seen

Washington

• • • **Production of bearings** used in all types of machines where friction is developed can be increased 25 per cent without extending manufacturing facilities, members of the Bearing and Bushing Industry Advisory Committee told WPB officials at a recent meeting.

The members pointed out that the increase could only be assured contingent upon steel requirements being met by steel mills with satisfactory delivery schedules, both as to tonnage and sizes.

Committee members said that a serious disruption of schedules is constantly taking place because the end users of bearings and bushings place their orders with schedules permitting only minimum lead time. The Committee said that at present a lead time of from 7 to 9 months should be required in order that realistic production schedules may be maintained.

Makers to Pay Freight On Hinges Shipped to Zone I

Washington

• • • **Manufacturers' shipments** of hinges and butt hinges into Kansas, Nebraska, North Dakota and South Dakota are to be priced on an f.o.b. and not a free freight basis, the OPA announced last week.

Under the original provisions of MPR 413 the four states were included in Zone I where transportation charges are borne by the manufacturer.

HAULAGE SYSTEM: Conveyor belts two miles long will be used to transport soil for the Anderson Ranch dam in Idaho. The belts, built by Goodyear Tire & Rubber Co. will also generate some of the electricity needed for construction of the dam.

Buy Tools through your Industrial Distributor

AVOID the additional delays of deliveries over long distances.

AVOID plant slow-downs due to unexpectedly short shipments.

SAVE precious Tool-hours by using your distributor's spare parts and repair service.

PATHFINDER...through Blocked Supply Routes

Master of the strategy of supply, your Industrial Distributor can often do the "impossible" in speeding deliveries of tools and other vital equipment to your plant. His efficient organization has stepped up its manifold peacetime services to handle the formidable supply problems of an industry at war.

He has complete information on sources of supply at his fingertips, and can often by-pass barriers that appear insurmountable. The time he spends in tracking down the equipment you need is often all out of proportion to his profits, but he cheerfully works the extra hours, knowing he is helping you produce the goods that will win the war.

For Electric Tools, call your Stanley distributor and save time—save work. Stanley Electric Tool Div., The Stanley Works, New Britain, Connecticut.

STANLEY
1843 TRADE MARK 1943

STANLEY *Electric* TOOLS

HOW SHEET MILL "DISCOVERED" 11 MUCH-NEEDED MEN

—and what Hele-Shaw Fluid Power Engineers had to do with it

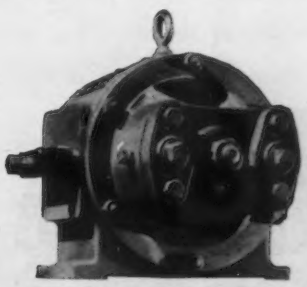
In a sheet mill, whose name we can't quote, men were laboriously reducing billets to sheets. Fourteen men were required to "manipulate" the billet and sheet in its journey, fourteen men needed elsewhere in the mill for essential war work.

This mill had used Fluid Power and had an idea Hele-Shaw Fluid Power Engineers might help them.

Before our engineers left they had: 1. schemed a hydraulic mechanism (powered by a Hele-Shaw pump, and functioning through valves and cylinders) which duplicated nearly all of the hand operations, and 2. whittled the number of men required from 14 to 3. One man now starts the billet through the rolls, one removes the finished sheet, and the third controls all intervening operations by means of a centralized push button control.

Saving labor is not always the reason for trying Fluid Power, and may not be yours. If you want to improve a product or process, or simplify the control or operation of a machine in your post-war planning, Fluid Power and Hele-Shaw engineers may be able to help you. Why not find out?

THE
Hele-Shaw
Fluid Power Pump



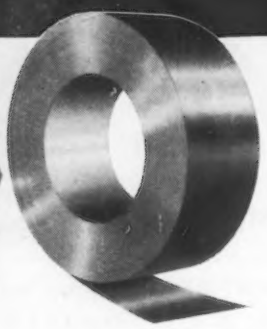
OTHER A-E-CO PRODUCTS: TAYLOR STOKERS, MARINE DECK AUXILIARIES, LO-HED HOISTS

AMERICAN ENGINEERING COMPANY

2410 ARAMINGO AVENUE • PHILADELPHIA, PA.

SPLIT-SECOND ACTION DEPENDS ON

STEEL ACCURACY . . .



Many vital steel parts in torpedoes depend upon Thomastrip's accuracy to specifications. Thomas has long since been meeting such difficult problems as these. They not only require uniformity, but also demand dependable duplication of its extremely high qualities. Experience in rolling cold rolled strip steel for precision war parts, Thomas not only offers uncoated but also special finishes for intricate production items. Investigate now the possibility of using Thomastrip in one of these finishes to either speed your production or to save non-ferrous metals, or to do both.

Thomastrip

COLD ROLLED STRIP STEEL

BRIGHT FINISH NOT COATED, SOLDER COATED, ELECTRO-COATED WITH NICKEL, ZINC, COPPER, BRASS

THE THOMAS STEEL CO. • WARREN, OHIO

NEWS OF INDUSTRY

Two New Industry Committees Appointed

• • • **The WPB has** announced the formation of the following industry advisory committees during the past week:

Malleable Iron Industry Advisory Committee

Government presiding officer: George F. Hocker; committee members: C. S. Anderson, Belle City Malleable Iron Co., Racine, Wis.; L. A. Dibble, Eastern Malleable Iron Co., Naugatuck, Conn.; Charles A. Gutenkunst, Jr., Milwaukee Malleable & Grey Iron Works, Milwaukee; A. F. Jackson, Michigan Malleable Iron Co., Detroit; W. H. Moriarty, National Malleable & Steel Castings Co., Cleveland; K. M. Smith, Lancaster Malleable & Steel Corp., Lancaster, N. Y.; John Wagner, Wagner Malleable Iron Co., Decatur, Ill.

Range Boiler and Tank Industry Advisory Committee

Government presiding officer: Vincent T. Manas; committee members: T. M. Bohen, Whitehead Metal Products Co., Inc., New York; M. H. Feldman, John Wood Mfg. Co., Chicago; K. P. Fuhrmann, Wheeling Steel Corp., Portsmouth, Ohio; R. E. James, Rheem Mfg. Co., Sparrows Point, Md.; Wesley Martin, A. O. Smith Corp., Milwaukee; E. Sedlachek, Scaife Co., Oakmont, Pa.; A. R. Hanson, L. O. Koven, Inc., Jersey City, N. J.; D. D. Smith, Porcelain Steels, Inc., Cleveland; O. S. Wessells, D. D. Wessells & Sons Co., Detroit.

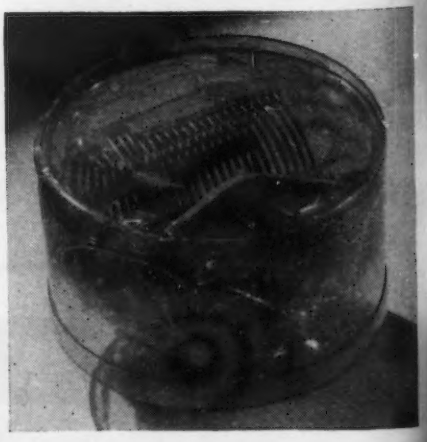
Molybdenum Group Named

Washington

• • • **WPB has announced** the following names of a Molybdenum Industry Advisory Committee, all from New York:

Marx Hirsch, Molybdenum Corp. of America; Carl M. Loeb, Climax Molybdenum Co.; C. T. Ulrich, Kennecott Copper Corp., and R. Van Fleet, United States Vanadium Corp.

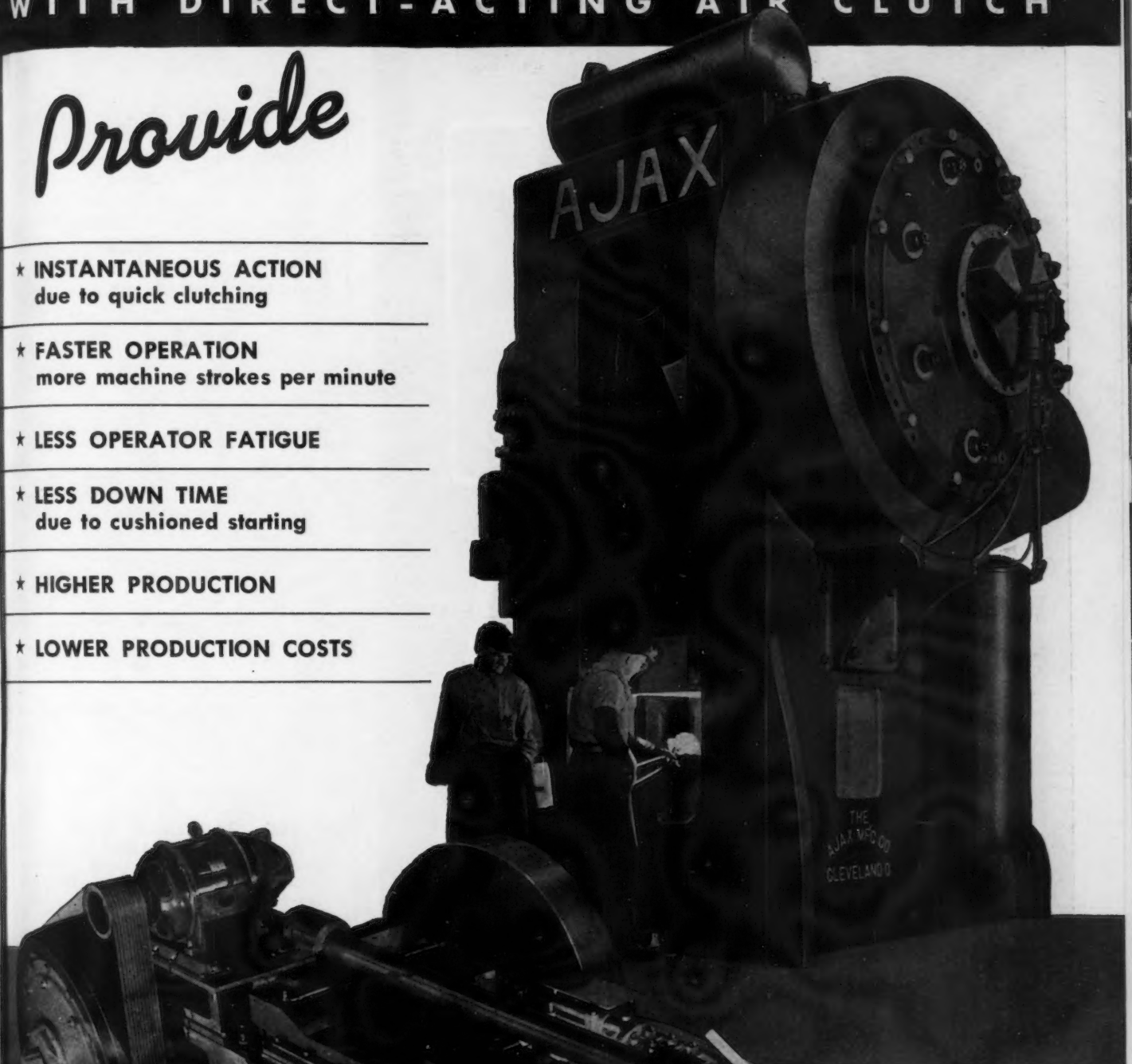
GLAMOUR PACKAGING: Vital spare parts arrive at the front fresh and ready for action, thanks to the protection of transparent, sturdy, Lumarith replacement kits.



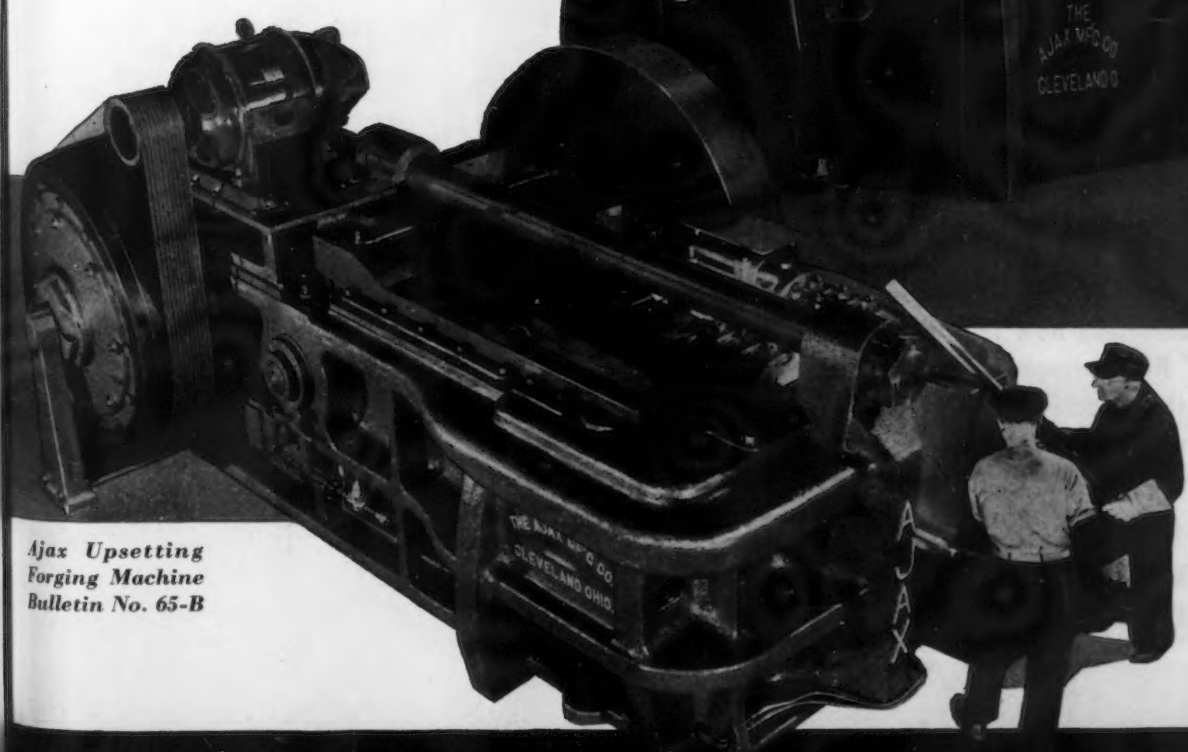
AJAX FORGING MACHINES AND FORGING PRESSES WITH DIRECT-ACTING AIR CLUTCH

Provide

- ★ **INSTANTANEOUS ACTION** due to quick clutching
- ★ **FASTER OPERATION** more machine strokes per minute
- ★ **LESS OPERATOR FATIGUE**
- ★ **LESS DOWN TIME** due to cushioned starting
- ★ **HIGHER PRODUCTION**
- ★ **LOWER PRODUCTION COSTS**



Ajax High Speed Forging Press Bulletin No. 75

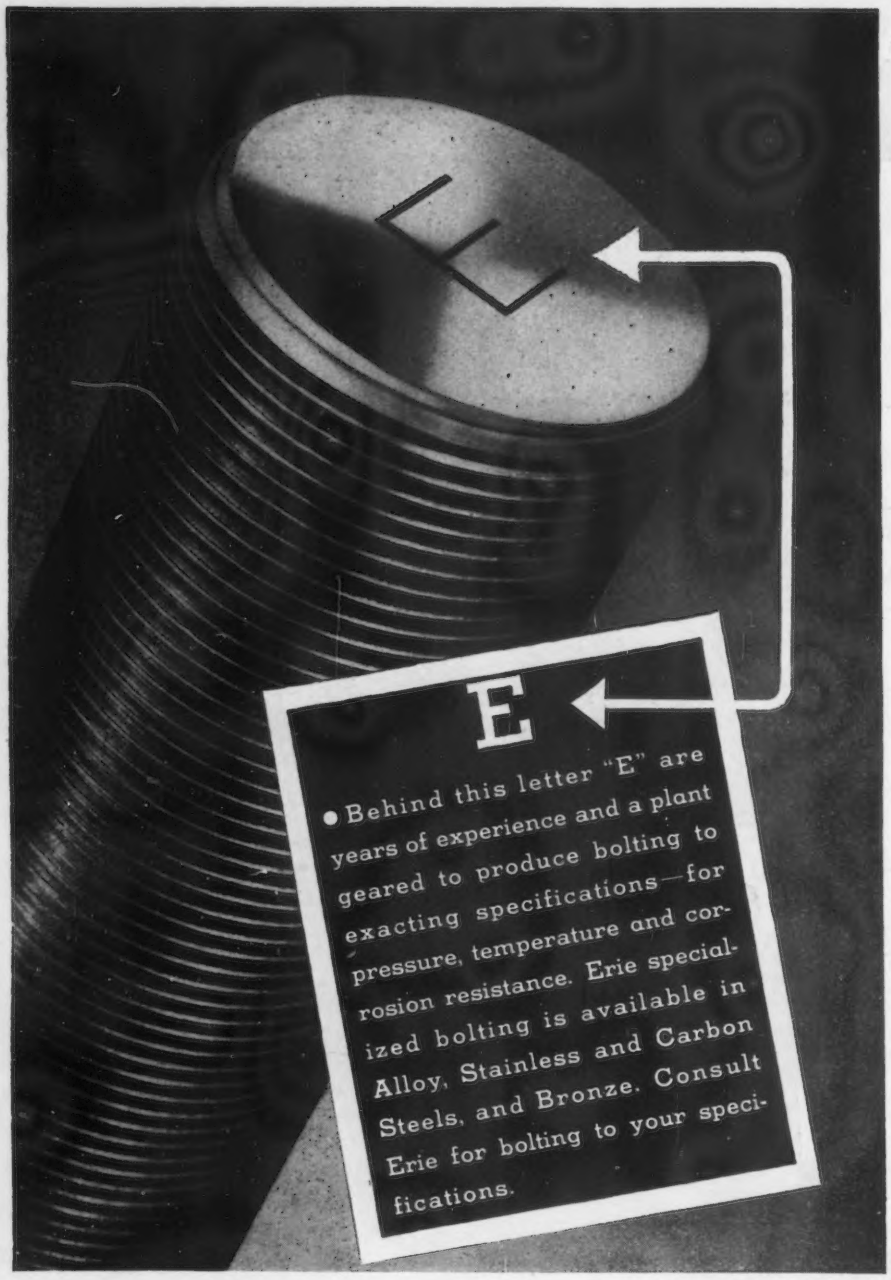


Ajax Upsetting Forging Machine Bulletin No. 65-B

THE **AJAX** MANUFACTURING COMPANY

EUCLID BRANCH P. O. CLEVELAND, OHIO

621 MARQUETTE BUILDING • CHICAGO, ILLINOIS



Your Boss Is Our Boss . . .

Today we are both working directly or indirectly for Uncle Sam —so we understand how important it is to concentrate on first things first. Regulations and restrictions set up by our government point the course we all follow. It means many times that personal service that has been so vital a part of our business life and all business life, must give way, temporarily.

The new things we are learning about specialized bolting, coupled with our old time idea on service, will profit our peace time customers when business gets back to normal again.

E-57

ERIE BOLT & NUT CO
ERIE, PA., U. S. A.

Price Relief Granted Ladle Brick Makers By OPA

Washington

• • • **Producers of ladle** brick who rave been unable to maintain or expand production because of their maximum prices, are granted relief in a modification of adjustment provisions by OPA in Amendment 1 to Order A-2 under MPR 188.

Prices may also be adjusted if it appears that a shortage exists or threatens to exist in the essential supply of ladle brick. Adjusted maximum prices many be based upon operating costs on a basis which will cover total costs.

Time Extended for Farm Parts Fabrication

• • • **The fabrication** of items of farm machinery for which critical material is allotted within the period April 1 to June 30, 1944, does not have to be completed until Sept. 30, 1944, under Limitation Order L-257 as amended by WPB. Under the original order manufacturers would have had to rush through the fabrication of all material allotted under L-257 before the order expires on June 30, 1944. The amended order also removes from Schedule A eleven items of farm equipment.

WATER - JACKETED DIES FOR PROPELLER BLADES: At the American Propeller Corp., Toledo, water-cooled cast-to-form dies are used in propeller blade manufacture. Illustrated are water-jacketed dies used on finished blades as they are quenched to final hardness.

HOW TO SAVE CRITICAL ALLOYS *BY THE TON!*

How do you intend to fabricate that steel you've ordered? Your answer may conserve tons of critical alloys...save you trouble in the bargain. This recent Frasse case history will testify:

The contractor had just ordered 2½ tons of high sulphur, free-machining stainless bars. Frasse, following its usual practice, made a routine check on the end use. Working on subcontract, purchasor was unable to give details—added that machineability was his only concern.

Frasse insisted. Purchasor contacted his prime contractor... learned that the steel was used for aircraft cable terminals. Familiar with this application, Frasse knew the parts would be swedged—warned that high sulphur stainless would crack in the operation.

Instead, Frasse recommended selenium free-machining, rather than a high sulphur stainless. The suggestion was accepted—with this subsequent comment by the customer: "Frasse foresight and knowledge saved us from machining critical alloys which would have been a total loss."

Here is conservation by the ton. Why not keep your steel source fully informed on your fabricating operations? Combined with his steel "know how", your data will eliminate expensive rejects...conserve critical material...help America do the job. *Peter A. Frasse and Co., Inc., Grand Street at Sixth Avenue, New York, N. Y. (Walker 5-2200) • 3911 Wissahickon Avenue, Philadelphia, Pa. (Radcliff 7100-Park 5541) • 50 Exchange Street, Buffalo, N. Y. (Washington 2000) • Jersey City, New Jersey Hartford, Connecticut • Rochester, N.Y • Syracuse, N. Y.*

Frasse

Mechanical and Aircraft STEELS

Seamless Mechanical and Aircraft Tubing • Aircraft Steels Cold Rolled Strip and Sheets • Welded Steel Tubing • Stainless Steels and Tubing • Drill Rod • Cold Finished Bars • Alloy Steels

Where Precision Built Parts are Vital

THE precision with which a plane roars through the sky has its beginning in many widely separated plants, turning out small parts and special equipment.

Production of small parts for aircraft needs, accurately machined to exact measurements, is a service FENN has rendered for many years. Their long experience in building special machinery has given them a sound knowledge of design and production.

Keep the name FENN in mind for machines and tools, design and development, and sound engineering counsel when the world once more turns to industrial peace-time projects in the days ahead.

FENN

THE FENN MFG. CO.
HARTFORD, CONN.
ESTABLISHED 1900

Farm Equipment Makers May Add Emergency Charge to Ceiling Prices

Washington

• • • **Manufacturers of farm** equipment parts are allowed to add emergency service charges to their ceiling prices through provisions announced Saturday by OPA.

Designed to aid the government program to keep production of farm equipment on schedule, the action was contained in Amendment No. 8 to Maximum Price Regulation No. 246 which becomes effective July 23.

The "emergency service charges" are limited to the extra costs incurred to make delivery at the request of the purchaser on a date which would not have been possible without these extra costs. The emergency costs may result either from the necessity of obtaining the same material from a more expensive source or from the use of a substitute material or a material of different specifications from that normally used by the part producer.

The action will not affect the ultimate farmer-consumers since the charge cannot be made unless the purchaser—a producer of farm equipment who incorporates into the equipment he makes parts supplied to him by others—agrees beforehand to absorb entirely the difference in costs. The addition of the charge also must be approved by OPA.

The new provision is applicable only in sales to manufacturers who incorporate the part into a completed item of farm equipment or into farm equipment parts produced by them.

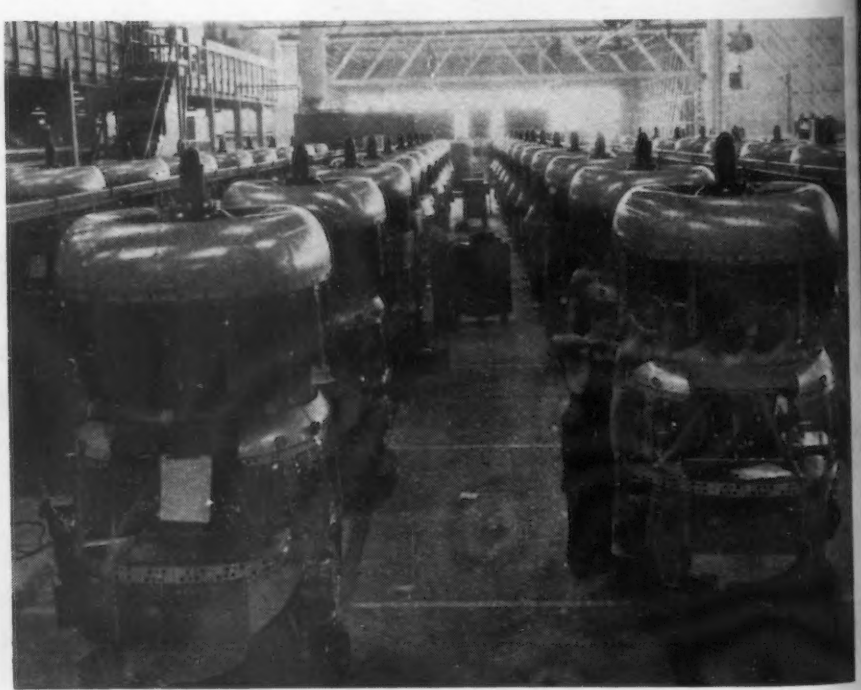
WPB Cancels Three CAA Airport Projects

Washington

• • • **Construction of three** Civil Aeronautics Administration airports was halted last week by the WPB in an effort to conserve materials equipment, and manpower. The airports, which would have cost a total of $2,371,179, are as follows: Aurora Municipal Airport, Aurora, Ill. ($1,200,000); Construction of an airport at Purcell, Okla. $630,000); Construction of a two-runway airport and taxiways at Beaver March, Ore. ($541,179).

"RUSH ORDERS": Every time these lines, on which motors are assembled, move 11 ft., a set of four powerful engines is ready for a Liberator Bomber. The four lines keep going day and night.

Wide World Photo, Los Angeles Bureau



IT HAD TO COME...

...this better Calibration Plate

Modern developments in welding electrodes have imposed new and more complex problems upon users. Now, with the many new variations in electrode coatings, accurate results require that you know what your WSR ratings are so that you can select exactly the right heat across the arc for each electrode.

To help you weld more efficiently . . . to take full advantage of present and future advancements in electrodes . . . P&H has developed the new "Visi-matic" Calibration Plate. Simple, easy to read, it eliminates guesswork by permitting you to select the *exact* heat required for each size and type of electrode.

As with other P&H advancements, the one thought behind the new "Visi-matic" Calibration Plate is to help you make *better welds, more easily, at lower cost.*

See Next Page ☛

NOW
ACCURATE HEAT CONTROL
is a simple matter

The new P&H "Visi-matic" Calibration Plate provides three color bands, corresponding to the three electrode groups for low, medium, or high voltage requirements.

Settings Provide For Varying Heat Requirements

Calibrated in amperes, the new "Visi-matic" Plate is used with any make of electrode. Not only does it enable you to compensate for variations in voltage with the amount of current or amperes, but also for the variations in coatings as illustrated by the typical electrodes below:

Down Hand
—Coatings burn off at a much slower rate than metal and therefore require higher voltages to insure ample heat across the wider arc gap.

All Position
—Coatings burn down more slowly than metal but the difference is not so great as in Down Hand.

Poor Fit
—Metal and coatings burn at approximately the same rate of speed. Amperage requirements are the lowest of the three groups.

By merely setting the stylus at the dot opposite the desired amperage, you are sure of the correct heat across the arc *on every job.*

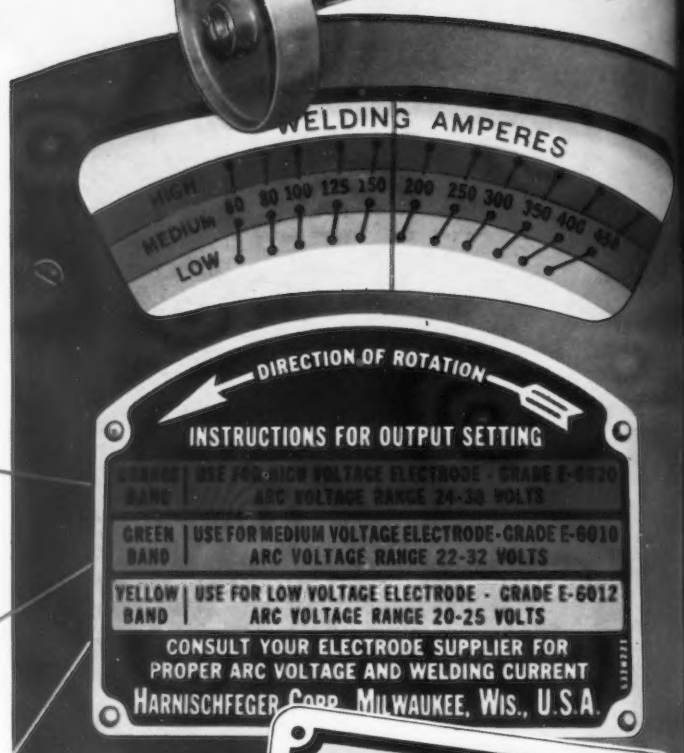
WSR (*Welding Service Range*) Ratings

All P&H Arc Welders are rated on WSR which is actual delivered output. You know exactly how much heat your machine will deliver from minimum to maximum.

Single Current Control

With P&H's single control, you have but one simple adjustment to obtain *any* welding heat within the machine's range. Arc response is automatic on all classes of work—with all types of electrodes.

P&H's outstanding advantages are: (1) Known Welding Service Range; (2) "Visi-matic" Calibration; and (3) Automatic Arc Response—all of which are accomplished with (4) Single Control for Welding Heat. Literature will be sent on request.



P&H ARC WELDERS

The complete line of P&H Arc Welders includes both A.C. and D.C. types in a wide range of capacities. All machines are rated on WSR (Welding Service Range). P&H also manufactures a complete line of welding electrodes.

HARNISCHFEGER CORPORATION

ARC WELDERS • EXCAVATORS • ELECTRIC CRANES P&H MOTORS • HOISTS • WELDING ELECTRODES

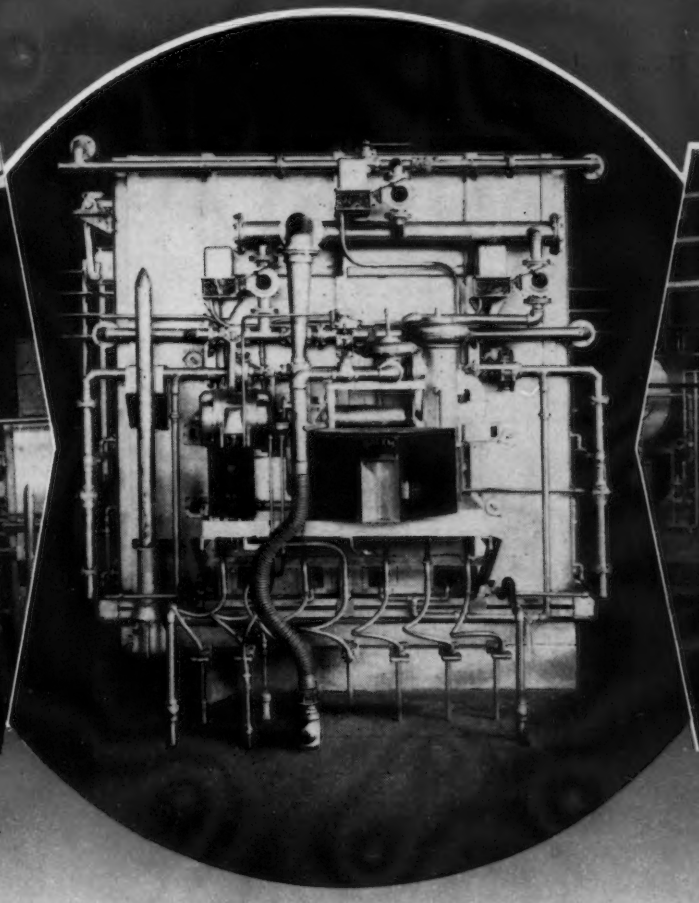
GENERAL OFFICES: MILWAUKEE, WISCONSIN

Canadian Distribution: **The Canadian Fairbanks-Morse Co., Ltd.**

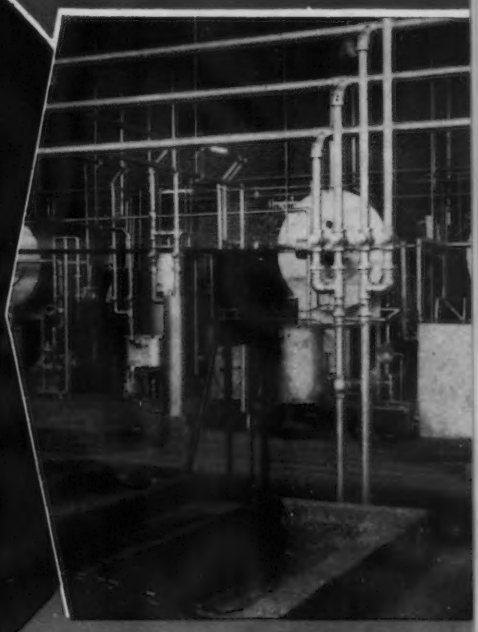
ANOTHER EXAMPLE OF SALEM ENGINEERING INGENUITY

ATMOSPHERE ANNEALING WITH DIRECT FIRING

Here the heating hood is raised, showing the inner cover under which the charge is placed. After the heating-soaking cycle is completed, the hood may be removed and placed on another charge, leaving the inner cover in position until the charge has finished cooling.



This shows the heating hood in place with thermocouples and fuel connections ready for operation. Notice the careful, clean-cut engineering construction.



SECO Gas Generator and Hot Purge Units are shown here. Having a capacity of 3,000 c. f. m., this equipment produces protective atmosphere of various compositions, each with its especial, correct analysis for any annealing purpose.

This Salem, direct-fired, protective-atmosphere annealing furnace will anneal high-carbon and low-carbon steel—bars, sheets, and strip. It is now being used to anneal SAE–52100 steel. Precisely controlled compositions of atmosphere may be varied to produce the correct analysis for each individual charge. Fired with gas at an operating temperature of 1450° F., this furnace has a capacity of 40,000 pounds of bar stock in one charge. The heating-soaking-cooling cycle is 20 hours.

Because Salem's method of direct-firing utilizes the full value of the heat, this furnace lowers cost of production and maintenance. The ingenious placement of Salem direct-firing burners creates swirling currents of heat which bathe the entire charge. This results in elimination of hot spots and provides precision controlled uniformity of temperature. Salem can help you solve any phase of your heat treating problems from design and engineering to building of equipment.

SALEM ENGINEERING COMPANY

SALEM ENGINEERING CO. · SALEM, OHIO

Five New Industry Committees Formed

Washington

• • • WPB last week announced the appointment of the following advisory committees:

Power and Distribution Transformer Industry Advisory Committee

John H. Darby, pres., Erie Electric Co., Inc., Buffalo; A. C. Farmer, asst. to vice-pres., Westinghouse Electric & Manufacturing Co., Sharon, Pa.; Samuel Horelick, pres., Pennsylvania Transformer Co., Pittsburgh; H. F. McRell, asst. mgr., General Electric Co., Pittsfield, Mass.; J. J. Mullen, Jr., exec. vice-pres., Moloney Electric Co., St. Louis; S. W. Stockwell, Davis Transformer Co., Concord, N. H., and A. Marcus, Eisler Engineering Co., Newark, N. J.

Welded Steel Tubing Industry Advisory Committee

T. C. Bright, Revere Copper & Brass, Inc., Rome, N. Y.; James A. Ireland, Republic Steel Corp., Cleveland; Arthur E. Jones, Metal Forming Corp., Elkart, Ind.; R. D. Malm, Clayton Mark & Co., Evanston, Ill.; C. E. Miller, Michigan Steel Tube Products Co., Detroit, and A. K. Smalley, Carpenter Steel Co., Roselle, N. J.

Vacuum Closure Industry Advisory Committee

L. T. Crabbe, Phoenix Metal Cap Co., Chicago; E. C. Emanuel, Armstrong Cork Co., Lancaster, Pa.; G. L. McClain, Aluminum Seal Co., New Kensington, Pa.; Charles Raney, Anchor Hocking Glass Corp., Lancaster, Ohio; Earl F. Turner, Hazel-Atlas Glass Co., Wheeling, W. Va.; A. H. Warth, Crown Cork & Seal Co., Baltimore; J. M. Wheaton, Owens-Illinois Glass Co., Toledo, Ohio, and Phil White, White Cap Co., Chicago.

Contractors Construction Machinery Industry Advisory Committee

Ed A. Daylor, E. A. Daylor Co., Coatesville, Pa.; Morris E. DeWitt, Porter-DeWitt Construction Co., Kirkwood, Mo.; U. Rutledge Hill, Clifford Hill & Co., Inc., Dallas, Tex.; J. J. McLaughlin, Great Falls, Mont.; Wade E. Moore, Forcum James Co., Dyersburg, Tenn.; Joseph R. Perini, B. Perini Sons, Inc., Framingham, Mass.; James J. Skelly, James J. Skelly Co., Media, Pa.; C. W. Smith, Smith Engineering & Const. Co., Pensacola, Fla.; D. W. Winkleman, D. W. Winkleman Co., Syracuse, N. Y.; Carl E. Nelson, Logan, Utah, and F. W. Parrott, C. F. Lytle Co., Sioux City, Iowa.

Bakery Machinery Manufacturers Industry Advisory Committee

C. D. Ackerman, Peerless Bread Machinery Co., Sidney, Ohio; A. M. Bornhofen, sales manager, Anetsberger Brothers, Chicago; Claud Bryson, Baker Perkins Co., New York; W. Clark Dean, Union Steel Products Co., Albion, Mich.; T. F. Freed, Read Machinery Co., Inc., York, Pa.; Fred D. Pfening, Fred D. Pfening Co., Columbus, Ohio; D. W. Smith, pres., Colborne Manufacturing Co., Chicago; A. W. Gellman, Gellman Manufacturing Co., Rock Island, Ill.; C. A. Ginter, Oliver Machinery Co., Grand Rapids, Mich.; Gay Larsen, gen. mgr., Middleby-Marshall Oven Co., Chicago; E. J. Lauterbur, The Hobart Manufacturing Co., Troy, Ohio; Martin Miller, American Machine & Foundry Co., New York; C. L. Russell, American Bakers Machinery Co., St. Louis, Mo.; Lee B. Thomas, Katzinger Pan Co., Chicago; and Thomas S. Vierow, Kotten Machine Co., Brooklyn, N. Y.

FIRST "PIONEERS OF INDUSTRY" AWARD: Edward G. Budd (left), president of Edward G. Budd Mfg. Co., Philadelphia, receives from Howard McCutcheon, president of the Student Council of the Murrell Dobbins Vocational School, the first award this Philadelphia school has made. The honor was bestowed upon Mr. Budd in recognition of the fact that he started as a "pioneer machinist who has not lost contract with the worker. . . ."

For GENERAL SURFACE GRINDING . . . . . .

THE 846 K-1 WHEEL CAN'T BE BEAT!

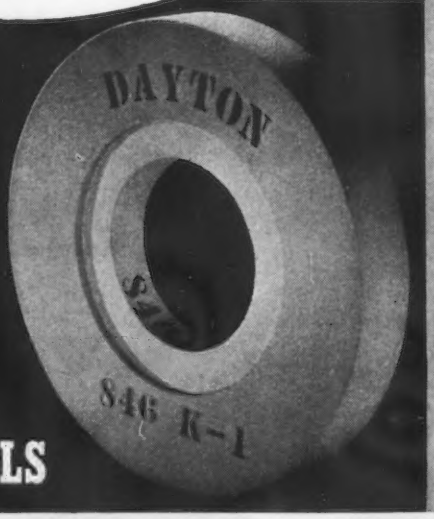
That's the opinion not of one . . . nor a few . . . but of hundreds of production men in scores of plants throughout America. And there's a reason. It's one of those all too rare wheels that give:

1. Excellent Finish
2. Maximum Stock Removal
3. Minimum Wheel Wear

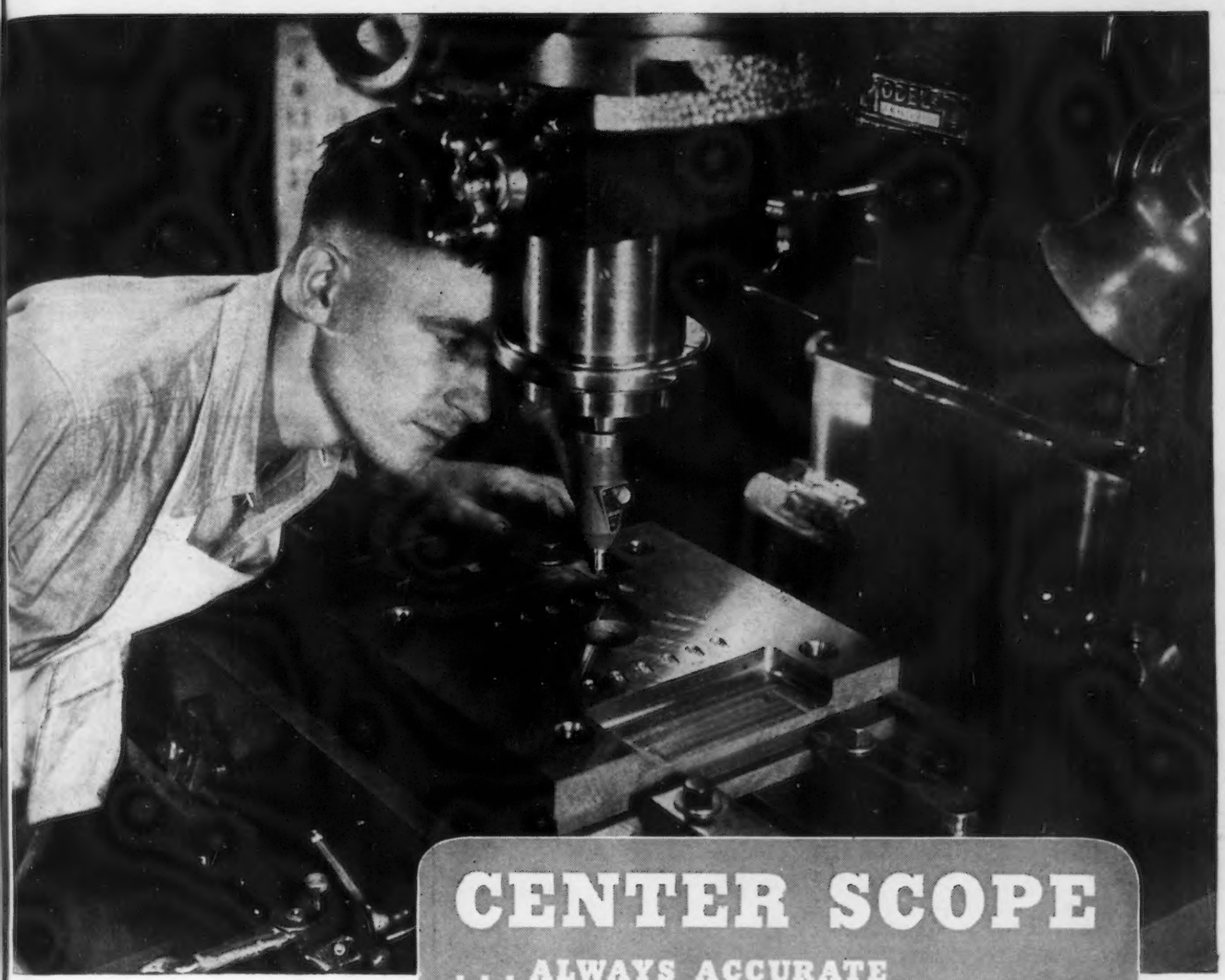
If you have a surface grinding problem, there's a good chance this 846 K-1 Dayton may be just the wheel you are seeking. Made in a wide variety of sizes . . . with shipment from stock in many cases.

SIMONDS WORDEN WHITE CO.
711 NEGLEY PLACE
DAYTON, OHIO

Our Technical Engineering staff is comprised of men experienced in particular fields and machine types. Their specialized knowledge is available to you any time or by appointment . . . no obligation.



DAYTON GRINDING WHEELS



CENTER SCOPE

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Better work at lower costs — is the universal report from shops using Center Scope, the optical locating tool. Job time estimates are being reduced, because Center Scope makes locating time shorter and gets more work out of each machine tool, from bench drill to lathe or jig borer.

Center Scope can be used without technical knowledge or training, and produces accuracy of plus or minus .0001″ or better the first time an operator uses it.

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Center Scope has many major functions applied to general machine shop work and to special and individual jobs.

Prices are attractive, too. Variable Center Scope, only $97 f.o.b. Los Angeles; Edge Block, $23 additional. Other models slightly higher. For full information, write for Bulletin No. CS301.

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Additional Contracts Are Awarded By War Department

Washington

• • • **Announcement** was made July 10 by the War Department of the following:

Award of a contract to J. & B. Construction Co., Los Angeles, for construction at an Army General Hospital in Los Angeles County, Cal., to cost in excess of $1,000,000. This work is to be supervised by the Los Angeles District Office of the Corps of Engineers.

Award of a contract to J. Emil Anderson & Son, Chicago, for construction at an Army General Hospital in Cook County, Ill., to cost in excess of $1,000,000. This work is to be supervised by the Chicago District Office of the Corps of Engineers.

Award of a contract to Breenan & Cahoon, Pocatello, Idaho, for construction of a military installation in Minidoka County, Idaho, to cost in excess of $1,000,000. This work is to be supervised by the Portland, Ore., District Office of the Corps of Engineers.

Award of a contract to A. Farnell Blair, Decatur, Ga., for construction at an Army Air Forces installation in Montgomery County, Ohio, to cost approximately $1,000,000. This work is to be supervised by the Dayton, Ohio, District Office of the Corps of Engineers.

Award of a contract to Panker Associates, Inc., Cincinnati, Ohio, for construction at an Army Air Forces installation in Montgomery County, Ohio, to cost in excess of $1,000,000. This work is to be supervised by the Dayton, Ohio, District Office of the Corps of Engineers.

Award of a contract to Charles H. Oehler, Galveston, Tex., for construction of a military installation in McCulloch County, Tex., to cost approximately $1,000,000. This work is to be supervised by the San Antonio District Office of the Corps of Engineers.

Ladish Drop Forge Co., Cudahy, Wis., will be provided with additional manufacturing facilities at a cost of about $800,000 by the Defense Plant Corp.

DPC has arranged to complete construction work at the Springfield Bronze & Aluminum Co. No. 2 plant, the former Rolls Royce plant, on which construction was stopped May 25.

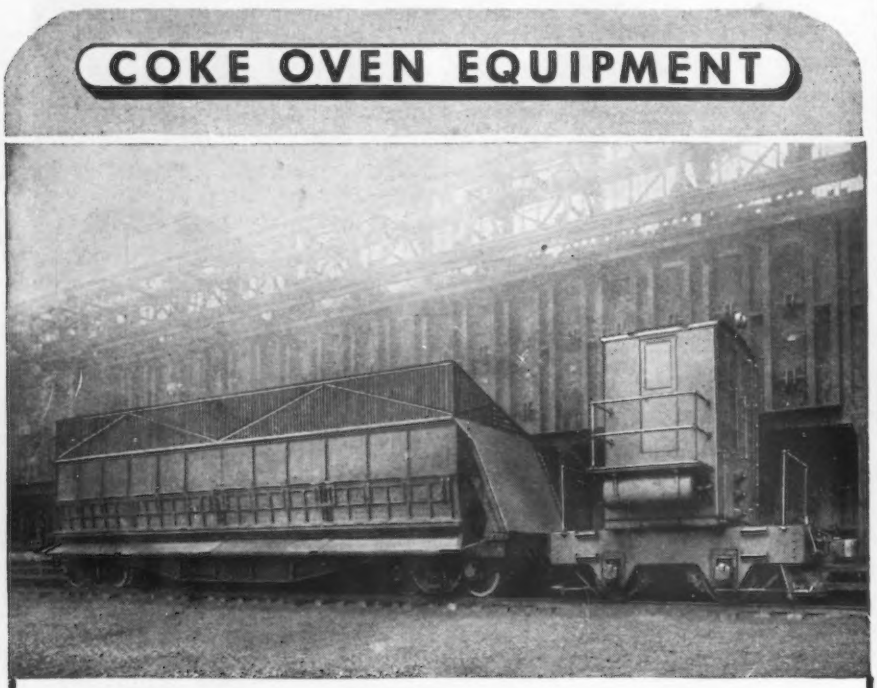
Gary No. 7 Stack Blown In; Capacity 1341 Tons Daily

Gary, Ind.

• • • **Ranking** as one of the largest blast furnaces in the world, the rebuilt No. 7 stack at the Gary works of Carnegie-Illinois Steel Corp., was blown in early this month. The capacity of this furnace has been almost redoubled and is now rated at 1341 tons daily. Ten months were required for the rebuilding.

Resumption at this furnace brings the blast furnace rate for the South works and Gary works of Carnegie up to 100 per cent, with 12 furnaces blowing at Gary and 11 at South Chicago.

FILING COMPARTMENT: To keep heavy dies safely stored and accessible, Bendix-Westinghouse Automotive Air Brake Co., Elyria, Ohio, makes use of lift truck equipment. Heavy wood racks form a "filing compartment" where dies may be quickly stored or withdrawn without disturbing other units.



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All Atlas Coke Oven Equipment is of heavy-duty construction permitting the peak operating conditions required in today's stepped-up production schedules. As a result of years of experience, Atlas is able to design and build equipment, to meet the requirements of each particular coke plant. Detailed information available on request.

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TALON STEEL TUBE DIVISION manufactures pressure and mechanical tubing on most modern and up-to-date equipment. These excellent production facilities, plus scrupulous care by skilled workmen during each operation, give you assurance that every length of tubing is uniform and has these important high qualities: uniform diameter, uniform wall thickness, uniformity of structure in the weld area, plus square and uniform cuts which permit savings of real importance.

Talon's Steel Tube Division has a substantial capacity devoted entirely to the war effort . . . another mill, now under construction, will increase even further Talon's production of steel tubes. When victory be ours, we believe that this excellent product will prove advantageous in your peacetime production operations. . . . . .

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WPB Actions Affect Numerous Commodities

Washington

• • • **Limitation Order L-216, Schedule V**—A schedule to conserve materials and increase productive capacity through a reduction in sizes and types of files was established Saturday by WPB. This action was taken in the establishment of Schedule V of Limitation Order L-216.

It is estimated that this schedule will conserve about 2,160 tons of carbon steel each year, or approximately 6 per cent of the total steel consumed by this industry. This saving will be realized through a reduction of the thickness of the rectangular cross-section of files and through a reduction of the number of sizes and types which are permitted to be manufactured.

Graphites

• • • **Conservation Order M-61**—The WPB has freed certain types of graphites for use in the manufacture of strategic graphite articles other than crucibles. To provide a more simplified method of procuring authorization for such manufacture the WPB issued Conservation Order M-61 as amended, which eases the restrictions of the original order. Several minor changes also have been made by the amended order.

Repair Materials

• • • **CMP Regulation No. 5, Int. No. 8**—Products or materials for repairs or replacements may not be obtained under CMP Regulation No. 5 if they are capitalized on the purchaser's books, except insofar as this is expressly permitted with respect to minor capital additions, the WPB announced. This ruling is contained in Interpretation No. 8 to CMP Regulation No. 5.

Food Machinery

• • • **General Limitation Order L-292, Amendment 2**—To expedite the handling of applications from government institutions, Order L-292 has been amended by the WPB to revise the definition of "approved orders" to include orders bearing a rating of AA-3 or higher on Form WPB-837 (formerly PD-408).

This order, and the revision included in the amendment refers to applications for ratings on orders for food processing machinery.

Laboratory Equipment

• • • **General Limitation Order L-144, Int. I**—An interpretation of paragraphs (b) (1) and (b) (2) of Order L-144 was issued by the WPB in response to inquiries by distributors of laboratory equipment as to regulations governing delivery to foreign consumers.

The same regulations governing the delivery to domestic sources will apply to deliveries proposed for shipment to foreign firms, individuals, etc.

Railroad Equipment

• • • **General Limitation Order L-97, Amend. 1**—Acting on the request of the Mining Division of the WPB, the Transportation Equipment Division will undertake the scheduling of all locomotives of 20 tons or under, which are to be used in above-ground mining operations, effective immediately.

Limitation Order L-97, as amended, will affect only the two above-named divisions.

Hatfield Appointed to WPB Production Scheduling

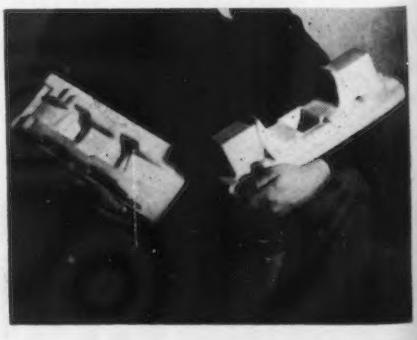
• •• **Appointment of Robert M. Hatfield** as Acting Director of the Producation Scheduling Division of WPB was announced Saturday by Harold Boeschenstein, Director of the Production Controls Bureau.

Mr. Hatfield has been Chief of the Boiler Section of the Power Division of the Office of War Utilities since January 10, 1942.

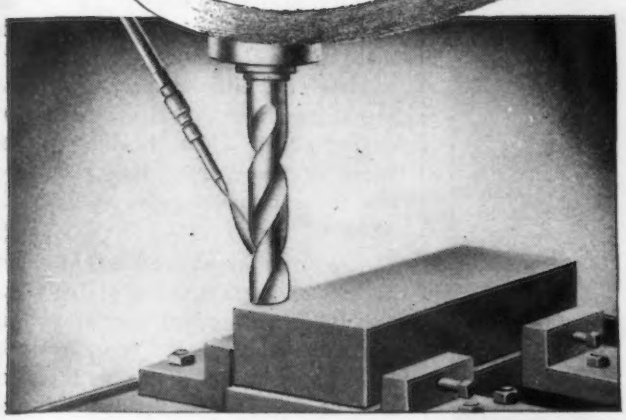
Harry Zellman, former Director of the Division, will continue with the Production Controls Bureau in a consulting capacity.

SUBSTITUTE: A special steel foundry plastic for use in patterns and coreboxes for casting steel has been developed by Hull Steel Foundries, Ltd., Hull, Quebec. The picture shows specimen plastic patterns for casting steel shoes comprising caterpillar track on Valentine tanks.

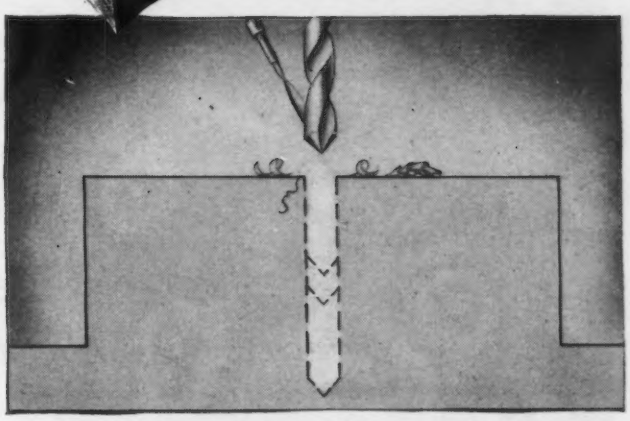
Richard Arless Photo



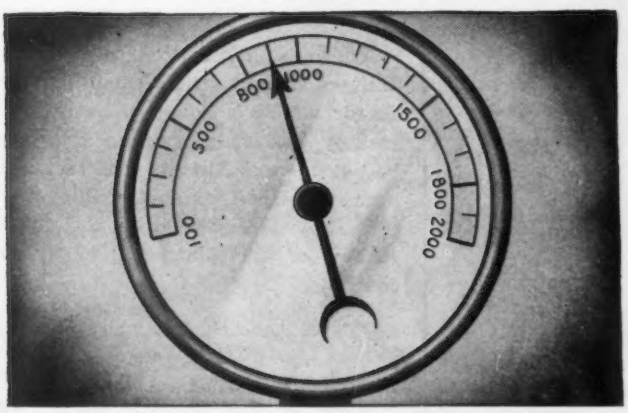
Helpful Hints for Drilling Tough Steel



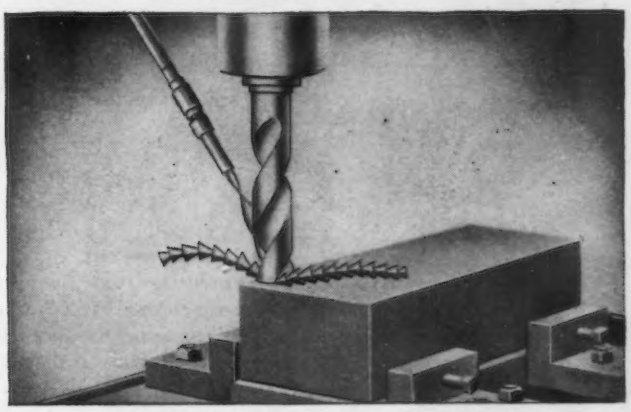
1. Use steady pressure and do not let drill ride without cutting. Back out the drill frequently to relieve chip congestion.



2. Back out when the drill has reached a depth three to four times the diameter of the drill for first insertion—one to two for second insertion —three to four for third.



3. To avoid drill breakage, always run at the proper speed. A 1/16" center drill should run about 1800 r.p.m. (30 s.f.m.). A 1" drill at 115 r.p.m. for same surface speed.



4. For deep drilling use a short spiral drill and Chillo No. 140 or 143, cut back with Amplex No. 00, further to reduce high temperatures. For shallow drilling use Chillo No. 90 or 93.

5. If you are faced with an unusual machining operation or if you are not satisfied with present results, call in a Cities Service lubrication engineer for consultation. His experience with Cities Service precision-made cutting oils on all kinds of machining operations is certain to help you as it has others. There is no obligation. For a copy of an informative booklet, "Metal Cutting Lubrication," write to Cities Service Oil Company, Room 1660, Sixty Wall Tower, New York 5, N. Y.

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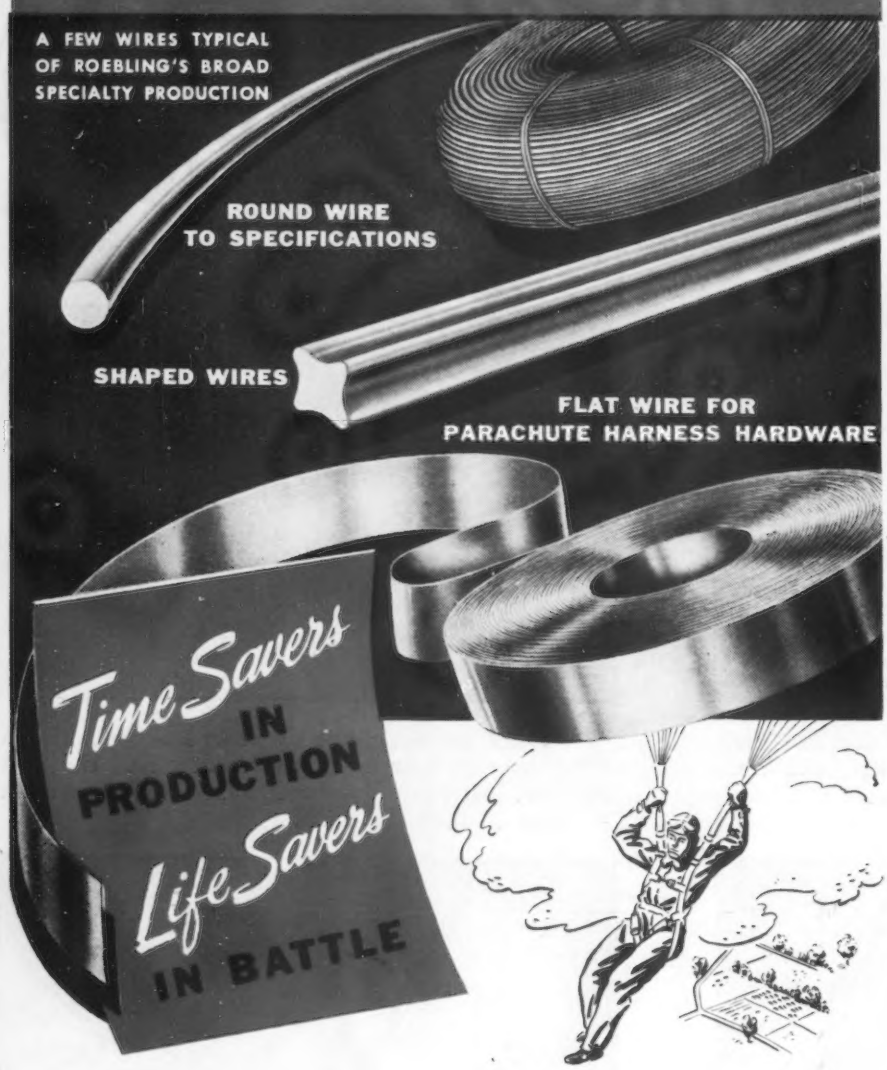

ARE YOU LOSING priceless production time in unnecessary machining, heat-treating, pre-finishing of "raw material" steels? Roebling can help you there by supplying specialty wires made to the most exacting specifications of analysis, temper, finish and dimensions—special shapes that *by-pass* machining—round wire that's ready for fabrication *as-received*—flat wires that need no nursing to enter into immediate *final* production!

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War Finishes Dominate Electroplaters' Convention

(CONTINUED FROM PAGE 59)

be available to produce coatings as thick as those demanded before the war?

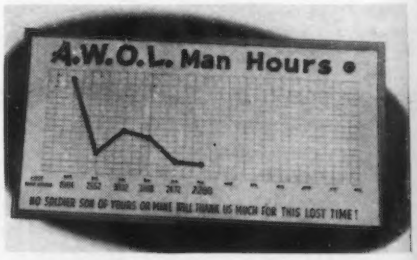
The facilities for anodically treating aluminum have been expanded tremendously since the outbreak of the war, he said, with the resulting possibility of a large quantity of obsolete or useless equipment on hand, unless it is adapted to some other use.

Without doubt among the anodic processes of the future will be one or more of the electrolytic polishing procedures used either purely to obtain a bright finish or to remove burrs and sharp edges from working parts. Some of these may also provide a use for equipment now used for aluminum.

Also to be considered is chromium plating of various types of tools, advocated almost since the advent of chromium plating, but comparatively little used until the war with its restrictions and shortages made it imperative that the life of tools be increased to the limit. On a purely economic basis there is ample reason to retain this application of plating regardless of the supply of alloy steels.

There is, in addition to the many things already mentioned, another factor which is going to be involved in any post-war program that may be set up and that is the factor of quality. Upon this probably more than anything else rests the future success of the plating industry, he concluded.

CONSTANT REMINDER: The Harnischfeger Corp., Milwaukee, has succeeded in reducing absenteeism from a high of 8184 man-hr. in September, 1942, to 2288 man-hr. in February, 1943, through an intensive drive. This sign is erected over the main entrance to the plant, as a constant reminder to employees.



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  Pittsburgh—Churchill 6967
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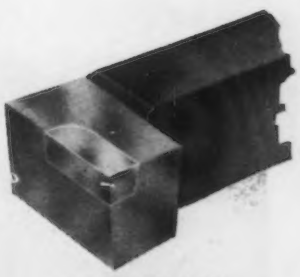
Leadership in any field carries with it the responsibility of SERVICE

In addition to supplying the steel-cutting industry with the most efficient carbide tools, KENNAMETAL Inc. maintains an extensive staff of skilled representatives. These representatives are located in the major manufacturing centers in order to provide more rapidly assistance in solving your steel-cutting problems. Because they have been chosen on the basis of experience in and knowledge of steel-cutting they are qualified to advise you in the selection of tools for specific operations and to suggest means for increasing tool life through the care and handling of your Kennametal tools.

As the leader in the steel-cutting carbide tool field Kennametal realizes its responsibility of service to you, its customer. Feel free to call on your Kennametal representative for assistance any time a steel-cutting problem arises in your shop.



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KENNAMETAL THE All American CARBIDE

Briefly Told—

Bethlehem Ordered To Raise Pay Scales In Eight Shipyards

● *WLB has ordered Bethlehem Steel Co. to raise pay scales, in some instances as much as 17c. an hr., for 10 occupations at which 12,000 men are working in eight Atlantic Coast shipyards. The shipyards affected are in Baltimore, Sparrows Point, Boston, Hoboken, Brooklyn and Staten Island. The reclassifications were made retroactive to March 3.*

●

● To undertake extensive work leading to the development of new materials and new production methods and to expand facilities for testing, Fairchild Aircraft Corp., Hagerstown, Md., has converted a large portion of its main Hagerstown plant into a test laboratory. The laboratory houses facilities for physical testing of aircraft materials and for making static tests on structural assemblies. The equipment is capable of reproducing the conditions of a tropical jungle, a desert or the temperate climates.

●

● The Canadian Department of Munitions and Supply announced that war contracts placed, and commitments on Canadian, United Kingdom and other accounts to the end of June totaled approximately $9,000,000,000, which indicated about $3,000,000,000 in new commitments since the beginning of this year. Contracts placed on Canadian account totaled $4,266,254,061. Orders placed on United Kingdom account amounted to $3,702,964,187. Contracts awarded on other account totaled $897,245,450.

●

● Unemployment compensation benefits for the state of Pennsylvania for the first six months of this year were less than three million dollars. During the same period last year over nine and a half million dollars was disbursed.

● *The Westinghouse Electric & Mfg. Co. has awarded approximately $173,000,000 worth of war orders to subcontractors since it inaugurated its "spread the work" policy early in 1941, a recent report to the company's board of directors shows. These subcontracts represented an estimated 52,000,000 man hours of work, or the equivalent of keeping more than 26,000 men busy for a year on the basis of a normal working day, according to A. W. Robertson, chairman of Westinghouse.*

●

● The Cardanic Corp., Easthampton, Mass., which was recently closed, may be opened by the Army at an early date. The company under contract to make bombsights for the Army failed to produce a single sight after 10 months of operation.

●

● How the installation of sound equipment throughout war plants sharply reduces industrial accidents and also serves as a rapid means of communication was explained by A. R. Royle, sound division sales manager of the Stromberg-Carlson Co., to more than 250 safety engineers who attended the annual conference of the Wisconsin Council of Safety, held June 27 at Milwaukee.

●

● The heaviest vessel cargoes in history are being brought into Buffalo by lake ore carriers this season as the result of the recommendation of the Lake Carriers Association that boats coming into Buffalo Harbor may have a draft of 21 ft., instead of 20 ft. The 21-ft. draft mark was set when Lake Erie rose to within three inches of its top mark since 1900, and lifted the harbor water at Buffalo 1½ ft.

●

● More than 3900 years of continuous service by 175 long-time employees of the Tennessee Coal, Iron & Railroad Co. is recorded among the many service awards made by the company, a subsidiary of the United States Steel Corp., for the second quarter 1943.

●

● *In a special citation, labor and management at the Nashville division of Consolidated Vultee Aircraft Corp. were commended for their low absentee rate by Charles E. Wilson, aircraft production chief of WPB. The Tennessee plant working on a 24-hr. a day schedule showed a five-month absenteeism average of 2.7 per cent.*

●

● Orders received by General Electric Co. during the first six months of this year amounted to $941,529,000 compared with $865,372,000 in the same period of 1942, an increase of 9 per cent, Gerard Swope, president, announced recently.

●

● Combining the functions of the former Division of Statistics, Planning Committee and Office of Progress Reports, a Bureau of Planning and Statistics has been established in WPB. Stacy May will be the director of the new bureau.

●

● *Navy yards and private shipbuilders completed construction of more than 6000 naval craft of all classes during the first half of 1943, an increase of 250 per cent over the same period of 1942. The vessels had an aggregate cost of approximately $2,500,000,000. Their combined tonnage exceeded 1,000,000 standard displacement tons.*

●

● A special training course for users of carbide dies has been put into operation at Carboloy Co., Inc., Detroit 32, according to an announcement by K. R. Beardslee, general sales manager, to meet the increased need for trained die room employes.

●

● In an extensive survey of post-war markets conducted in behalf of United States Steel Corp. by George W. Wolf, president of United States Steel Export Co., great potential markets for steel at home and abroad are indicated. The survey found the automobile industry to have especially promising prospects.

●

● Secretary Ickes asserted last week that he did not think it practicable at this time to return to their owners the coal mines now under government operation and control. According to Ickes' figures coal production now is behind about 25,000,000 tons.

●

● Among 175 employees of the Tennessee Coal, Iron & Railroad Co., Birmingham, to receive service awards recently were C. E. Abbott, vice-president, and Dr. Lloyd Noland, director of the company's health department. Mr. Abbott was honored for 40 years' service; Dr. Noland for 30 years service.

●

● No. 1 blast furnace of the Sloss-Sheffield Steel & Iron Co., Birmingham, has been taken out of blast for relining above the mantle. The stack, which had been in continuous blast on foundry iron for six years and three months, is expected to be returned to production in about three weeks.

●

● *No, the bash of a bottle does not give a destroyer the push that sends it gliding down the ways. Nor does it slide seaward on bananas. People sometimes ask, at U. S. Steel's Federal shipyard, but the truth is that a fighting greyhound has to be "unhitched." In the last minute before a launching, the destroyer stands in a gigantic wooden "cradle" resting upon double runways which have been coated with several tons of grease. The warship is held "hitched" by two steel plates. At a signal, the burners—in pairs on each side of the ship—begin cutting the plates. In 20 seconds, the plates part, and another powerful ship has been unleashed.*

MACARTHUR LOCK: Official opening of the Gen. Douglas MacArthur lock, newest and deepest of the four locks in the Sault Ste. Marie Canal, took place July 12. The freighter Carl D. Bradley is passing though the new lock.

Press Association, Inc.

FOR GREATER SPEED

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DEOXIDINE #170, admirably suited to the processing of steel shell cases, is but one of a number of grades of ACP acid cleaners. The immersion process in which it is used is adaptable to the cleaning of many other ordnance or marine parts. Other grades of DEOXIDINE are available for brush or spray processes where these are indicated for expediting production.

DEOXIDINE #170 is a chemical that removes light oil, annealing scale and eradicates rust and rusters, producing a clean, minutely-etched, paint-receptive surface. The rusters, even though invisible, are destroyed, eliminating the possibility of defects developing beneath the protective finish. DEOXIDINE does not produce a coating on the cleaned surface which on shell cases, for example, might crack in crimping and in obturation and ruin the protection of the final finish.

DEOXIDINE meets U.S. Ordnance Department requirements for its efficiency in removing rust and neutralizing rust producers before protective finishes are applied.

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Send today for Deoxidine #170 Pamphlet showing how simple it is to use.

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EE-7

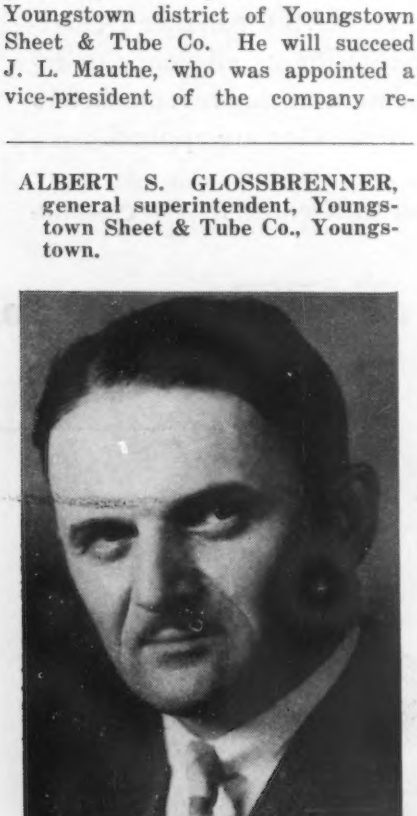
PERSONALS

• **R. K. Bowden,** former manager of the Chicago district metallurgical department of Carnegie-Illinois Steel Corp. has been promoted to the position of director of quality control, research and technology department of that company in Pittsburgh. Mr. Bowden has been associated with Carnegie-Illinois since 1930 when he began as superintendent of alloy steel production in the South Chicago plant. Before joining the Carnegie-Illinois, Mr. Bowden was associated with the Niles Brick Co., Niles, Ohio; Central Steel Co., Massillon, Ohio; Crucible Steel Co., Pittsburgh, as well as Central Alloy Steel and Republic Steel Corp. **L. J. Rohl** has been appointed manager of the metallurgical department in Chicago district of Carnegie-Illinois succeeding Mr. Bowden. Mr. Rohl has been assistant manager of the metallurgical department since 1936. He, too, began his association with the corporation's subsidiary in the Chicago district's South Chicago plant.

• **John P. Stoner** has been appointed purchasing agent for Stoner-Maurer Co., Monroe, Mich. He succeeds **Walter W. Shepard** who left the company recently to enter the Navy.

• **Albert S. Glossbrenner** has been appointed general superintendent of the Youngstown district of Youngstown Sheet & Tube Co. He will succeed J. L. Mauthe, who was appointed a vice-president of the company recently. Mr. Glossbrenner came to Youngstown eight years ago as assistant superintendent of the hot strip mill, becoming superintendent three years later. He was appointed to his recent position as superintendent of the Brier Hill plant in 1942. **Buford M. Stubblefield** has been appointed superintendent of the Brier Hill Works succeeding Mr. Glossbrenner. Mr. Stubblefield started to work for the company in 1916 at the Campbell Works Coke Plant; in 1920 he became assistant superintendent of the Coke Plant. A few years later he was made superintendent of the coke plant and blast furnaces at Campbell Works.

ALBERT S. GLOSSBRENNER, general superintendent, Youngstown Sheet & Tube Co., Youngstown.



R. K. BOWDEN, director of quality control, Carnegie - Illinois Steel Corp., Pittsburgh.

• **A. H. Richards,** former far western regional chief of the Industrial Salvage Branch has resigned to go to Washington with the Bureau of Economic Warfare as consultant on the export and import of strategic ores and minerals. Richards was with the American Smelting & Refining Co. for 42 years. He retired in November, 1941, as general manager on the Pacific Coast and vice-president of the Federated Metals Division.

• **Don S. Neher** has been appointed regional manager of the salvage division on the West Coast succeeding Col. Francis M. Smith, now regional manager of the SWPC. **William Breuer** has become regional chief of the scrap processors division, succeeding Mr. Neher. **L. L. Koonce** is the new regional chief of the industrial salvage division in the same area succeeding A. H. Richards. He was sent from Washington where he had been in charge of tin and can salvage nationally. Formerly he was with the Shell Oil Co.

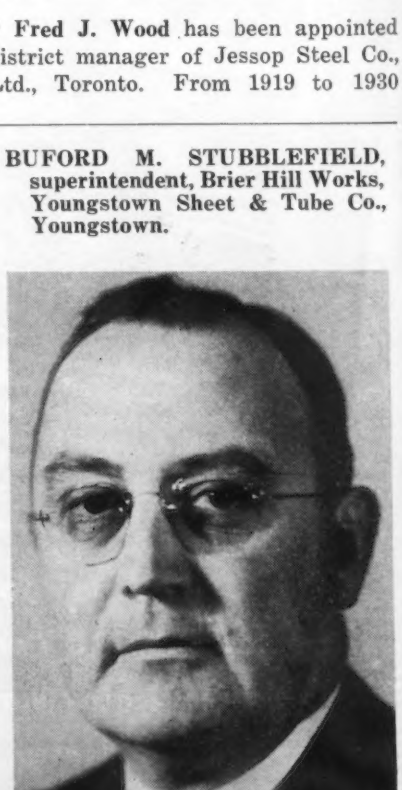
• **R. W. Gemmell** has been made manager of the aviation section, industry engineering department, and **W. A. Mechesney** manager of the aviation section under the industrial department, Westinghouse Electric & Mfg. Co., Pittsburgh. The appointments followed the recent formation of the aviation section. Mr. Gemmell will handle engineering problems connected with the aviation industry, while Mr. Mechesney will supervise commercial problems involving the application of Westinghouse products to that industry.

• **Harry M. Dent,** president of Durez Plastics & Chemicals, Inc., North Tonawanda, has been elected to the board of directors of the Marine Trust Co., Buffalo. Mr. Dent spent six years in research work on modern plastics with the E. I. du Pont de Nemours & Co., Inc., and in 1923 opened his first manufacturing plant in North Tonawanda. He is recognized as one of the leaders in the plastics industry and as president of one of the oldest plastics manufacturing organizations.

• **William S. Richardson,** general manager of the industrial products sales division, B. F. Goodrich Co., Akron, Ohio, has been elected chairman of the OPA mechanical rubber goods industry advisory committee.

• **Fred J. Wood** has been appointed district manager of Jessop Steel Co., Ltd., Toronto. From 1919 to 1930

BUFORD M. STUBBLEFIELD, superintendent, Brier Hill Works, Youngstown Sheet & Tube Co., Youngstown.



Mr. Wood operated his own manufacturing business, and afterward was a manufacturer's agent for 10 years. He was previously associated with a tool manufacturer before joining the Jessop Steel Co.'s Detroit office in 1942.

• **B. A. Swanson,** manager of the engineering department of Kelly O'Leary Steel Works, Chicago, was given a citation for exceptional contribution to the war program. The citation was in formal recognition by the United States Army of the work of Mr. Swanson in effecting large savings of steel and contract cost through redesign of facilities used in Army depots throughout the country for the storage and loading of bombs.

• **Robert N. Yates** has been appointed sales manager of Erie Foundry Co., Erie, Pa. Mr. Yates has served in the sales department for the past several years.

• **D. B. McCoy** has been appointed general sales manager, Steel Co. of Canada, Ltd. He succeeds **George Spence,** who is retiring from the position of general sales manager which he has held since 1926. Mr. Spence joined the Steel Co. of Canada, Ltd., on its formation in 1910. Mr. Spence's experience in the industry has been a varied one, being successively stock clerk, head of invoicing, costing and accounting. He was in charge of the company's New York office in the interests of its export trade during World War I. He has travelled extensively on trade missions to the Antipodes, the Orient, Africa, Europe and South America. Mr. McCoy also joined the Steel Co. of Canada, Ltd., in 1910. He successively became sales representative for Northern Ontario, Eastern Ontario, manager of the Vancouver office; manager of the Toronto office and later assistant general sales manager. In 1941 Mr. McCoy was assistant to H. R. MacMillan, president, Wartime Merchant Shipping, Ltd.

• **George Greeley,** former secretary of the trust department of the First National Bank, Oshkosh, Wis., has been appointed assistant secretary of the Wisconsin division of Timken-Detroit Axle Co.

• **S. H. Mortensen,** chief engineer of the Milwaukee Allis-Chalmers electrical division and author of text books and articles on electrical generation, has been elected a national director of the American Institute of Electrical Engineers for a four year term.

• **C. O. Wanvig, Jr., Wyeth Allen** and **J. Fletcher Harper** were named to the board of directors of the Globe Union, Inc., Milwaukee. **William Wanvig** was elected secretary of the firm to succeed **W. B. Fyffe,** now in service, and **C. J. Ehrendreich** was named secretary and treasurer to succeed Mr. Wanvig.

• **Fred H. Wilhelm** has been appointed chief draftsman and assistant to the chief engineer of the Thew Shovel Co., Lorain, Ohio. Mr. Wilhelm was formerly in charge of the design of small machines.

• **Dr. Joseph Slepian,** associate director of the research laboratories of Westinghouse Electric & Mfg. Co., Pittsburgh, was presented the Benjamin Garver Lamme Medal awarded annually by the American Institute of Electrical Engineers. Dr. Slepian was selected for his contributions to the development of current interrupting and current rectifying apparatus.

• **Clyde Wyman** has been appointed chief metallurgist for Burnside Steel Foundry Co., Chicago. He will be in charge of the melting and heat treating laboratories. For the past 17 years he has been associated with the Oklahoma Steel Casting Co., Tulsa, Okla., as metallurgist and assistant works manager.

• **John R. Harbaugh,** has been appointed metallurgical sales engineer. Jessop Steel Co., Washington, Pa. He will deal in special applications of alloy tool and die steels. Mr. Harbaugh has been affiliated with the metallurgical department at Jessop for the past five years in the position of service metallurgist. **H. E. Doughty,** has been appointed assistant general sales manager. He will specialize in high speed tool steels. He has been with the Jessop company since 1931. **R. P. J. McCarty** has been appointed special stainless steel representative for the New England, New York, Buffalo, and Philadelphia territories. He had extensive experience in tool design and stainless steels application prior to joining the Jessop organization. **W. E. Wilson** has been named to specialize in stainless steel. He has been connected with the production, fabrication and sales of stainless steel since the advent of its use in the United States. He will make his headquarters in Chicago and will cover the Chicago, Indianapolis, Detroit, Cleveland, and Cincinnati territories. **John Walker** was selected to serve as special composite steel representative. Mr. Walker was previously connected with American Rolling Mill Co., Allegheny-Ludlum, and the Blaw-Knox Co. **E. H. Dau,** previously connected with the Carnegie-Illinois Steel Corp., for thirteen years, and with an extensive and thorough background serves as special sheet and plate representative for Jessop.

• **D. M. Whyte,** foundry expert of the Cooper-Bessemer Corp., has been appointed supervisor in charge of casting sales of the corporation's two foundries, one at their Mt. Vernon, Ohio, headquarters and the other at Grove City, Pa. Whyte, who has been with Cooper-Bessemer for the past 20 years, is known throughout the industry for his contributions to the development of new foundry methods and techniques.

• **E. J. Krause** has been named assistant director of service on war products and automotive for Buick. For the past several years he was service manager of the Buick Detroit zone.

OBITUARY...

• **Louis C. Marburg,** secretary and treasurer of Marburg Brothers, Inc., New York, died recently. Mr. Marburg had been associated with the Sprague Electrical Co., General Electric Co., and the Allis Chalmers Co. before joining his brother, Theodore H. Marburg, in founding Marburg Brothers in 1910. He was 67 years old.

• **Samuel Reid Russell** of the explosives department, E. I. du Pont de Nemours & Co., died suddenly July 8. He worked as a construction engineer for several companies before he joined du Pont in 1907 as a salesman in the Nashville, Tenn., office. He soon was transferred to the technical division, and became one of the country's first specialists in dynamiting techniques. He was senior technician at the time of his death. An authority on all kinds of quarry and marine blasting, Mr. Russell perfected the method of tunnel blasting in open quarries. He was often called in as a consultant to the government on various projects, the deepening of Honolulu Harbor being one of many, and one of particular interest.

MACHINE TOOLS

. . . News and Market Activities

Machine Tool Men Praised By Gen. Hammond

Chicago

• • • **Machine tool manufacturers,** dealers and engineers who contributed their time, without pay, during the early days of the war program to aid the Ordnance Department locate machinery, devise production techniques, etc., were described as the "white hopes" of the early days of the war by Brig. Gen. T. S. Hammond, chief of the Chicago ordnance district in a recent talk before Mid-West ordnance plant executives.

These men knew where every piece of machinery in the district was located, General Hammond said. "If procurement of a certain piece of ordnance called for production by a certain type machine, they supplied the information we needed or suggested an alternate method of production," he explained, "and often at the expense of their own interests."

See page 95 of this issue for a special news story upon machine tools. See the Assembly Line, page 72, for discussion of surplus and obsolete tools.

"Many of these men spent two or three days a week in this office working without pay to find the solution to ordnance problems. If, on the other hand, we needed a specific man to do a specific job we were able to call upon industry for that man and never once were we refused. No praise can be too high for these men," he said.

General Hammond warned against cutting off subcontractors during the present period of readjustment, explaining that the services of these subcontractors may be required at any moment should changes in war strategy require new emphasis on certain items.

•

Tool Manufacturers Prepare By Broadening Line of Goods

Cincinnati

• • • **Although** the district manufacturers indicate a continued flow of new business at a reasonably good volume, interests, of course, continue to broaden in products or means of continuing to operate plants when the machine tool rush is completely over. One or two plants are already producing other items than machine tools on a subcontract basis, but so far the actual operation has not become general. Other plants, of course, are considering the proposition and in most instances plans are out of the blue print stage and some tooling up is going forward, so that the operation on other than machine tools will probably broaden during the remainder of this year. Coupled, of course, with this fact, machine tool manufacturers do not find a tremendous pressure for help that was heretofore noticeable. In many instances, replacement of men who have quit or who have gone into the Army have not been made, since this would provide a very orderly method of reducing working forces as order books dwindle.

•

RADIO IDEA-MAN: Lawrence Handler at the Westinghouse Lamp Division, Bloomfield, N. J., developed an idea that saves critical materials and nine production hours daily by preventing breakage of radio tubes needed for war purposes. The machine tool fixture he designed is a collar-like device with three metal "jaws" which fits over the end of the tube mechanism to hold it in place while the glass bulb is sealed around it.

Amendment Alters Machine Pricing Setup

Washington

• • • **Withdrawal of the** limitation on the effective period of a provision in the machinery price regulation which permitted wholesalers to adjust their maximum prices on certain items if they were based on lower manufacturer's prices than those in effect to them on October 1, 1941, was announced recently by OPA.

Substantially the same adjustment provision was reinstated by Amendment No. 95 to Regulation 136 which was issued by OPA effective July 23, 1943. However, it will also apply to machines and parts listed in "Appendix B" of the regulation.

The effective period of the former provisions was limited to 30 days but many wholesalers had not become familiar with the provision until it had elapsed.

Trade Notes

Interlake Chemical Corp., Chicago, was recently incorporated by Great Lakes Steel Corp., and Interlake Iron Corp., joint owners of the new firm. A tar and acid and naphthalene plant owned by Interlake Iron Corp. has been sold to the new company, which will manufacture chemicals used in the production of plastics.

•

Siewek Tool Co., Ferndale, Mich., and the **Progressive Tool & Cutter Co.,** Hartford, Conn., have been acquired by Domestic Industries, Inc., Chicago. The two companies will hereafter be operated as the Siewek Tool Division of Domestic Industries.

•

Barber-Colman Co., Rockford, Ill., has appointed the Edwin C. Anderson Co., Denver, Colorado, as distributor for their products in Colorado, Wyoming and Nebraska.

•

Submarine Signal Co. will operate the Precision Mfg. Co., Fall River, Mass., plant under a new arrangement with the Navy. Arrangement provides for purchase of the minority interest in the company.

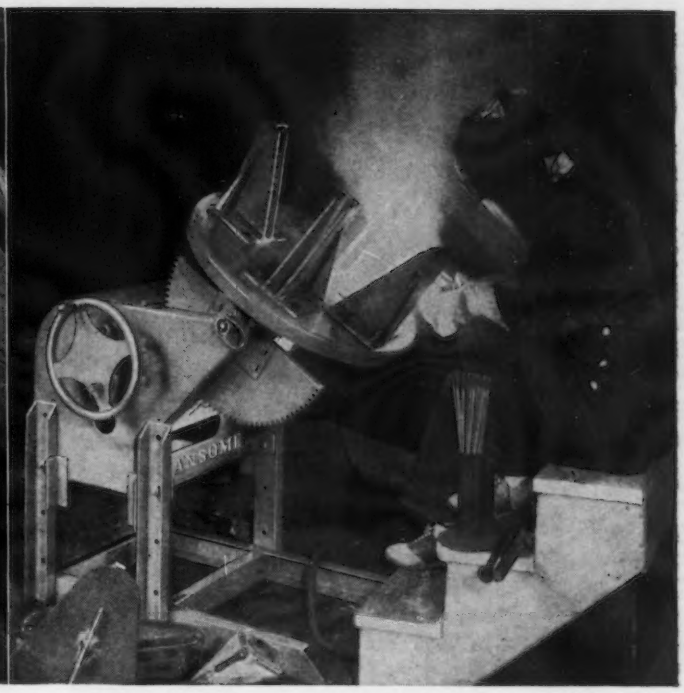
•

York Ice Machinery Corp., York, Pa., has announced the company will be known as the York Corp. as a result of final court approval on a plan of merger and recapitalization.

•

Williams Gauge Co., 2035 Pennsylvania Avenue, Pittsburgh, has appointed two new representatives for the Salt Lake City territory. William H. Saylor and H. E. Barsford of the Specialty Sales Co. in that city will represent the company in southern Idaho, eastern Nevada, southwestern Wyoming, and Utah.

Installation of a motor-operated unit with variable speed is recommended for circular work.



Hand-operated unit, used by woman welder with set-up of several similar pieces . . . a real time saving.

Now . . . A 500-POUND WELDING POSITIONER BY RANSOME . . . *Motor or Hand-Operated*

The elevating sub-base is a big help in handling large unwieldy pieces.

Showing the importance of the 45° "down-under" position, eliminating resetting of work. The double-end pipe flange shown is typical.

Here's a versatile machine that will help you do better welding faster . . . on a wide variety of work. It's top-quality equipment and ideal for women welders.

- **Table top tilts to 135° from horizontal (45° beyond vertical).**
- **T-slots in table top simplify clamping of work.**
- **Handles a 500 lb. load with a 6-inch center of gravity and a 6-inch eccentricity.**
- **Cut gears are used throughout.**
- **Clutch permits free rotation of table top, by hand.**
- **Available with elevating base, to give 42 inches from floor to table top.**
- **On motorized machine, Reeves variable-speed drive gives range up to 1 r.p.m. for table rotation. Choice of power or hand-wheel tilting.**

Other Ransome Positioners cover a range of types and sizes up to 20 tons. ***Write for literature*** . . . and for recommendations to meet your particular needs.

Ransome WELDING POSITIONERS

INDUSTRIAL DIVISION • RANSOME MACHINERY COMPANY • DUNELLEN, NEW JERSEY

NON-FERROUS METALS

. . . News and Market Activities

Kennecott Asks WLB to Review Order

• • • **The Kennecott Copper Corp.** has petitioned the National War Labor Board to review the order issued by the Non-Ferrous Metals Commission that the company discharge 165 employees of the Chino Mines Division at Hurley, N. M., who are delinquent in union dues.

The order was issued upon complaint of two locals of the International Union of Mine, Mill & Smelter Workers (CIO) that the company has refused to comply with the maintenance-of-membership agreement. The commission did refuse the union's request for a checkoff.

Horace E. Hitchcock, counsel for the Kennecott Copper Corp., maintained that enforcement of the commission's order would require discharge of the delinquents and nullify directives of the War Manpower Commission for the stabilization of employment. Their discharge, he said, would be "disastrous" and would seriously affect the production of copper. The company had offered to accept voluntary assignment of dues from union members.

Lee Pressman, general counsel for the CIO, insisted that the company should be required to check off union dues. Failure to do so would be "a complete negation of the effectiveness of maintenance of membership clauses." He also denied that it would be necessary to discharge any employees if the commission order were upheld since all would then pay their back dues.

•

No Allocations for Zn Dust

• • • **Small amounts of zinc dust** produced from ores, concentrates, metallic zinc, or from scrap, dross and other primary or secondary material can now be sold by dealers as well as producers without an allocation order. Conservation Order M-11-1 as amended permits any producer or dealer to ship and deliver zinc dust to any other person without an allocation certificate provided that the person receiving the shipment certifies in writing to the producer or dealer at the time of delivery. However, the total amount of zinc dust delivered during the month from all sources cannot exceed 75 lb. Another provision of the amended order is that dealers shall not make any shipments to a person holding an allocation certificate for the applicable month.

•

Al Castings Section Offers Its Help

• • • **The Castings Section** of the WPB Aluminum and Magnesium Division offers assistance to all users of aluminum castings (sand, permanent mold or die) who now have, or believe they may have, difficulty in finding suitable sources of supply. The Castings Section pointed out after a survey of the aluminum foundries that the procurement of castings will become more and more difficult.

Conversion Charges Limited

• • • **A uniform limit** to the fees and charges which may be made for conversion of copper scrap and copper alloy scrap in toll transactions was announced today by the Office of Price Administration.

Charges for processing, treating, handling and other services performed in toll conversions henceforth may be no larger than the difference between the maximum price for the scrap metal and the ceiling price for refined copper.

The new ceiling on toll charges is established in Amendment No. 2 to Maximum Price Regulation No. 20 (Copper Scrap and Copper Alloy Scrap), effective July 14.

Toll agreements most common in industry practice today are transactions in which owners of copper scrap or copper alloy scrap turn the metal over to a smelter, refiner, or other processor for conversion into refined copper metal to be returned to the owners.

Under the new ceiling on toll charges, the largest charge that could be made for conversion of 9¾c. scrap copper, for instance, would be 2¼c. a lb.

•

Plants Glutted with Scrap

• • • **Scrap brass and scrap aluminum** is reported by the big war plants to be backing up on them because of the inability to find buyers. One big plant is reported to be unable to move a pound of nonferrous scrap while another is getting rid of its huge aluminum scrap yield through the benevolence of one dealer who apparently is simply storing it in his yard awaiting developments at the smelters.

•

Reclaim Cu from Gilding Metal

• • • **The recently organized** Metals Chemicals Corp., Pittsburgh, expects in the next two to two and half months to be in full operation of reclaiming copper from gilding metal clad scrap. The new company will be housed adjacent to the stockpile of gilding metal clad scrap of a nearby plant. About 12,000 to 15,000 tons of this scrap is said to be there. New officers have not yet been announced.

SIMPLE REMEDY: At General Electric's Schenectady Works it was discovered that by hanging a number of brass chains over the arm ports of a carborundum blasting booth, discharge of static electricity between the operator's arms and the blasting enclosure is eliminated.

Information Free

(1) A Report to the Nation:

A 24-page illustrated booklet, entitled "A Report To The Nation," shows company's plant, many products and methods of machining. Gives history of plant, describes methods of manufacturing, personnel and some of products, and outlines prospects of the future. *Lombard Governor Corp.*

(2) Filters:

A file-size 32-page booklet, "Quick Facts on Keeping Fluids Clean," gives factual information about Cuno Filter installation in eleven major industrial classifications and includes 46 actual case studies. *Cuno Engineering Co.*

(3) Steel:

A revised standard steel analysis chart designed to aid wartime steel users. *American Steel & Wire Co.*

(4) Metallizing Surfaces:

Folder descriptive of Mogul Electric Bonder for preparing hardened metal surfaces for metallizing. Specification, price and other money saving information are given. *Metallizing Co. of America.*

(5) Cemented Carbides:

Descriptive catalog concerned exclusively with milling metals with cemented carbides. Entitled "Specialized Milling with Grayson-Kennametal Milling Cutters," the catalog describes these milling cutters and their applications. *The McKenna Metals Co.*

(6) Pickling Chain:

Folder is concerned with chain used in acid pickling tank slings. Made of bronze, the chain is built up by casting one link through the other by a series of ingeniously arranged molds. Table of reference for different loading conditions, at angles from 90 to 5 deg. is given. *Bronze Die Casting Co.*

(7) Catalog Supplement:

8-page supplement is a condensation of the company's regular catalog and is cross-section of its five lines of products, which include tubing, pipe, valves and fittings. *The Weatherhead Co.*

(8) Tube Spinning:

Catalog E-1 is 30-page brochure profusely illustrated with many of the varied shapes that have been made by the patented spun-end process, and contains drawings showing graphic comparisons between the new and old methods. *Wolverine Tube Div., Calumet & Hecla Consolidated Copper Co.*

(9) Manganese Steel:

"Manganese Steel for General Industry" is the title of 48-page Bulletin No. 543-G. In addition to showing how many ways this steel can prove helpful to industry in general, there are sections devoted to the company's X-ray facilities, its metallurgical and testing laboratories; to technical formulae and a question-and-answer dissertation on managanese steel. *American Manganese Steel Div., American Brake Shoe Co.*

(10) Control Equipment:

Bulletin No. 116 is concerned with the basic problems involved in soaking pit operation, the importance of correct temperature conditions, length of soaking period, effect of furnace atmosphere upon scale control, economical pit operation, combustion efficiency, etc. Heat balance and thermal efficiency is discussed and a heat balance approximation is included. *Askania Regulator Co.*

(11) Electronic Drive:

Mot-O-Trol, an electronic adjustable-speed drive which provides wide stepless range, automatic speed regulation and smooth fast acceleration with automatic current limitation, is described in a 4-page illustrated booklet, B3256. *Westinghouse Electric & Mfg. Co.*

(12) Tubing Chart:

Convenient reference chart gives standard sizes for alloy seamless aircraft tubing. Arranged in a cross tabulation, outside diameters are in vertical columns from 3/16 to 3 in., and wall thicknesses in horizontal lines from 0.022 to 0.250 in. *Michigan Seamless Tube Co.*

(13) Hydraulic Units:

Two new 4-page catalogs, one describing hydraulic power units and the other hydraulic test units, are illustrated with photographs of different models, and adaptations for various operations are suggested. *Hydraulic Machinery, Inc.*

(14) Whiteprints:

Folder illustrates how an Ozalid print with maroon lines on a white background stands up in comparison with a blueprint under actual shop conditions. Describes the dry developing process and pictures the whiteprint machines. *General Aniline & Film Corp.*

(15) Centerless Grinding:

48-page booklet, "Principles of Centerless Grinding," No. G-503-1, contains many illustrations and the latest information on centerless grinding. Table of grinding wheel recommendations gives the new symbols adopted by The Grinding Wheel Manufacturers Association. *Cincinnati Milling & Grinding Machines, Inc.*

(16) Template Book:

"Pipe Templates for Welded Fittings" is the title of a 12-page booklet which tells how to fabricate fittings for welded piping installations by means of flame-cutting and welding. Shows how to draw up and use paper templates for flame-cutting pipe to assure accurate, close fitting connections. *Air Reduction Co.*

(17) Woman's Viewpoint:

12-page illustrated book No. 1950, entitled "A Message from the Women Soldiers of the Production Front," contains the interesting speeches of four women workers who were selected by women co-workers in the welding, machine shop, small-tools and assembly departments, as delegates to represent them at a monthly meeting of the plant supervisory group. *Link-Belt Co.*

(18) Duplicating Equipment:

Hydraulic duplicating equipment capable of being attached to any standard type lathe, planer, shaper, grinder or milling machine is featured in a two-color, well illustrated booklet. The advantages of using duplicators in the machining of parts having irregular internal or external contours are set forth. *Turchan Follower Machine Co.*

NOTICE TO READERS: Your request for this information will be forwarded promptly to the manufacturer issuing the literature, and the offer is good for only two months.

7/22/43

THE IRON AGE, New York 17, N. Y.

Send the free booklets circled below:

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INFORMATION FREE (Continued)

(19) Vertical Slotter:

New edition of 4-page catalog describes some of the ways the Universal Slotmaster may be used to save tools and setups. A conventional, horizontal and angular setup is shown, together with a description of tooling for cutting an internal gear, chuck jaw teeth and feed cans, broaching splines, lapping deep impression dies, etc. *Experimental Tool & Die Co.*

(20) Coated Abrasives:

16-page booklet describes and illustrates various types of Metalite cloth abrasives. Composite photograph shows varied uses to which they may be put. *Behr Manning Corp.*

(21) Tubular Rivet:

12-page manual is descriptive of the Rivnut, an internally threaded and counterbored tubular rivet which can be headed blind. Complete description of standard countersunk and flat head types, and the grip range are given, together with two pages of charts, tables on typical ultimate strength, strength in double shear with no reinforcements, torque resistance of Rivnut keys, thread strength, and shear and tension tests. *B. F. Goodrich Co.*

(22) Multi-Motor-Mount:

"Up to 30 hp." is the theme of a 4-page catalog, describing the three models of transmissions for motorizing various cone-driven machine tools. Fourteen different installations are pictured, including lathes, shapers, milling machines, automatic slotters, vertical and horizontal boring mills, etc. *Western Mfg. Co.*

(23) Surface Plates:

Folder sets forth the advantages of Meehanite surface plates, and lists standard sizes available. Also illustrates slotted angle irons and straight edges. *Barco Scraping Co.*

(24) Fine Pitch Hobs:

15-page booklet, entitled "Facts About Small Fine Pitch Hobs" is concerned with general characteristics of hobs, and gives small diameter gear hob limits and four pages of tables of gear tooth parts, fine pitch series, AGMA Recommended Practice. *Barber-Colman Co.*

(25) Turning Mills:

Bulletin No. 188 illustrates and describes turning rolls for facilitating the welding of large cylindrical tanks and drums. *Industrial Div., Ransome Machinery Co.*

(26) Precision Lathes:

12-page file-size catalog is devoted to bench and metal column base type lathes available in three models. Tabulated specifications give complete information on capacities, feeds, speeds, and dimensions. *South Bend Lathe Works.*

(27) Equipment Maintenance:

5-page Special Service Report concisely describes materials and methods for cleaning and germicidal treatment of respirators, goggles, helmets, and other safety equipment. *Oakite Products, Inc.*

(29) Tool Grinders:

Folder illustrates Models 30 and 50 grinders, designed for the free hand grinding of tungsten carbide tipped tools as well as other hard metal tools requiring the keenest cutting edges and extreme accuracy. Gives specifications for each model. *Willey's Carbide Tool Co.*

(29) Hard Facing:

Booklet entitled "Hard-Facing with Coast Metals" briefly outlines means of restoring worn parts to original dimensions by means of a welded overlay of exceptionally wear-resistant alloy that is claimed to make the hard-faced part more serviceable than it was when new. *Coast Metals, Inc.*

(30) Tubing Data:

"Steel Tubing for Aircraft Use" is the name of a booklet which gives up-to-date purchasing data, specifications, information and definitions. The material is presented in handy, outline form for easy reference. *The Ohio Seamless Tube Co.*

(31) Forging Furnaces:

16-page two-color bulletin has complete illustrations of different types of forging furnaces, together with all specification data of sizes, burnering and other necessary information. *Mahr Mfg. Co.*

(32) Speed Control:

Folder describes and illustrates reducer-type transmission, stressing the combination of variable speed mechanism and gear reducer in single compact unit. *Reeves Pulley Co.*

(33) Punching Units:

Bulletin G gives brief description of manufacturing and engineering facilities as well as the patented features built into Wales punching and notching units. *Wales-Strippit Corp.*

(34) Woodworking Tools:

Catalog showing 1943 line of production machine tools and woodworking production tools and accessories has 52 pages of illustrations and detailed information on power tools, with the best uses for many interesting and unusual accessories described. *Delta Mfg. Co.*

(35) Vibrating Equipment:

Profusely illustrated 176-page Catalog No. 750 covers complete line of electric vibrating equipment for solving many material handling and processing operations in all industries. *Jeffrey Mfg. Co.*

(36) Automatic Control:

"What is Duplimatic and How Does It Work?" is the title of a 16-page, 3-color folder which shows how the Duplimatic provides full automatic control to put intricate milling, turning, boring, shaping, die-sinking and similar operations on a high speed production basis, by means of a simple method of converting variations in electrical impulses into hydraulic motion. *The Detroit Universal Duplicator Co.*

(37) Non-Ferrous Castings:

4-page bulletin covers the production facilities in magnesium, aluminum, bronze, brass, and other non-ferrous metals. Weight comparisons and the mechanical properties of magnesium are given. *Howard Foundry Co.*

(38) Tapping Machine:

Bulletin describes and illustrates the Bakewell No. 0, with capacities of No. 0-80 to 8-32 in steels, for extreme threading accuracy on a mass production scale. *Bakewell Mfg. Co.*

(39) Carbide Tipped Tools:

Catalog covers all dimensions, carbide forms, clearances and prices on four standard styles of right- and left-hand finish ground, carbide tipped tools, as well as square and pointed tipped tools. The same information is available on a handy carboard wall chart. *New England Carbide Tool Co.*

(40) Carburizing Baths:

16-page booklet discusses liquid carburizing baths for temperatures from 1450 to 1750 deg. F., with photographs of carburized specimens. Gives table of critical temperatures of SAS steels and hardness conversion table. *The A. F. Holden Co.*

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Refiner, Smelter Quotations

(Cents per lb.)

Copper, electrolytic, Conn. Valley	12.00
Copper, electrolytic, New York	11.75
Copper, Lake	12.00
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.67
Lead, St. Louis	6.35
Lead, New York	6.50
Aluminum, virgin 99+%, delivered	15.00
Nickel, electrolytic, base refinery	35.00
Magnesium, 99.9+%, carlots	21.50
Magnesium, 12-in. sticks, carlots	30.00
Cadmium, delivered	90.00

ALUMINUM, No. 12 foundry grade (No. 2), 13.50c. per lb.; steel deoxidizing grades, 12.50c. to 13.75c. per lb. ANTIMONY, Asiatic, New York, nominal; American, 14.50c. a lb., f.o.b. Laredo, Tex., smelter. MERCURY, $191 to $193 per 76-lb. flask, f.o.b. shipping point or port of entry. BRASS INGOTS, commercial 85-5-5-5 (No. 115), 12.25c. a lb. COBALT, 97 to 99 per cent, $2.11 per lb. BERYLLIUM COPPER, 3.75 to 4.25 per cent Be., $15 per lb. contained Be. GOLD, U. S. Treasury, $35 an oz. INDIUM, 99.5 per cent, $10 per troy oz. IRIDIUM, $165 per troy oz. PALLADIUM, $24 per troy oz. PLATINUM, $35 per oz. SILVER, open market, New York, 44.75c. per oz. ARSENIC, prime, white, 99 per cent, 4c. per lb.

Copper, Copper Base Alloys

(Mill base prices)

Sheet: Copper, 20.87c.; high brass, 19.48c.; low brass, 80 per cent, 20.15c.; red brass, 85 per cent, 20.36c.; commercial bronze, 90 per cent, 21.07c., 95 per cent, 21.28c.; manganese bronze, 28.00c.; muntz metal, 22.75c.; naval brass, 24.50c.; phosphor bronze, grades A, B, 5 per cent. 36.25c.; Everdur, Herculoy, Olympic or equivalent, 26.00c.; nickel silver, 5 per cent, 26.50c.

Rods: Copper, hot rolled, 17.37c.; drawn, 18.37c.; free cutting brass, 15.01c.; low brass, 80 per cent, 20.40c.; red brass, 85 per cent, 20.61c.; commercial bronze, 90 per cent, 21.32c., 95 per cent, 21.53c.; Muntz metal, 18.87c.; naval brass, 19.12c.; phosphor bronze, grades A, B, 5 per cent, 36.50c.; Everdur, Herculoy, Olympic or equivalent, 25.50c.; nickel silver, 5 per cent, 28.75c.

Extruded Shapes: Copper, 20.87c.; architectural bronze, 19.12c.; manganese bronze, 24.00c.; Muntz metal, 20.12c.; naval brass, 20.37c.

ALUMINUM

Tubing: 2 in. O.D. x 0.065 in. wall; 2S, 40c. per lb. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier; 2S and 3S, 21.2c. per lb.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base price for tubing; 30,000-lb. base price for plate, flat stock. Variations from the above gage, size, temper, finish and quantity require extras.

Extruded Shapes: "As extruded" temper; 2000-lb. base price. 2S and 3S, factor No. 1 to 4, 25.5c. per lb.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by the weight per lineal foot. All prices above are subject to factor number range, temper, length, dimensional tolerances and quantity extras.

Wire, Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 24c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Variation from the above size, temper, finish and quantity require extras.

MAGNESIUM

Sheet, rod, tubes, bars and extruded shapes are subject to individual quotation. Magnesium Metal Turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c. a lb.

NON-FERROUS SCRAP METAL QUOTATIONS

Copper, Copper Base Alloy

(Current OPA maximum prices, cents per lb., f.o.b. point of shipment, plus premiums for quantities and special preparation.)

OPA Group 1

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25

OPA Group 3

Yellow brass soft sheet clippings	8.625
Yellow rod brass turnings	8.375
Zincy bronze borings	8.00
Zincy bronze solids	8.00
Fired rifle shells	8.25
Brass pipe	8.00
Old rolled brass	7.75
Admiralty condenser tubes	8.00
Muntz metal condenser tubes	7.50
Plated brass sheet, pipe reflectors	7.50
Manganese bronze solids	7.25[1] 6.25[2]
Manganese bronze borings	6.50[1] 5.50[2]

OPA Group 4

Automobile radiators	7.00

OPA Group 5

Refinery brass	5.00*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Aluminum

(Current OPA maximum prices, cents per lb., for less than 1000 lb. lots, f.o.b. point of shipment, plus premiums for quantities and special preparation.)

Plant scrap, segregated

2S solids	9.00
All other solids	8.50
Borings and turnings	
Wrought alloys (17S, 18S, 32S, 52S)	7.50
High grade alloys	7.00
Low grade alloys	6.50

Plant scrap, mixed

All solids	7.50
Borings and turnings	5.50

Obsolete scrap

Pure cable	9.00
Old sheet and utensils	7.50
Old castings and forgings	8.00
Pistons, free of struts	8.00
Pistons, with struts	6.00
Old alloy sheet	7.00

For lots of 1000 to 19,999 lb., add 1c. to above prices except for old castings and forgings, pistons free of struts, pistons with struts and old alloy sheet for which there is a premium of ½c. a lb. For lots over 19,999 lb. add 1½c. a lb. to prices listed.

Magnesium

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	8.00

Mixed, contaminated plant scrap

Grade 1 solids	11.00
Grade 1 borings and turnings	7.00
Grade 2 solids	9.00
Grade 2 borings and turnings	5.00

For lots over 1499 lb. add 1c. per lb.

Zinc

(Current OPA maximum prices, cents per lb., f.o.b., shipping point.)

New zinc clippings, trimmings	7.25
Engravers', lithographers' plates	7.25
Old zinc scrap	5.75
Unsweated zinc dross	5.80
Die cast slab	5.80
New die cast scrap	4.95
Radiator grilles, old and new	4.95
Old die cast scrap	4.50

Lead

Soft and hard lead, including cable lead, f.o.b. point of shipment, deduct 0.55c. per lb. from basing point prices for refined metal.

Nickel

Nickel content 98 + per cent, copper under ½ per cent, 26c. per lb.; 90 to 98 per cent nickel, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25⅛
Electrolytic, full size	22⅞c.
cut to size	30⅛
Rolled, oval, straight, 15 in. and longer	23¼
Curved	24¼
Brass: Cast, 82-20, elliptical, 15 in. and longer	23⅝
Zinc: Cast, 99.99, 16 in. and over	16¼
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00–13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz. lots	40.82–41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc cyanide, 100-lb. dms.	33.00
Zinc sulphate, 89% crystals, bbls.	6.80

SCRAP

. . . News and Market Activities

More Factors Point to Scrap Peril

• • • **A new note of warning** against a tightening scrap supply later this year is beginning to take on prominence in the form of extremely light collections and the closing of many small yards. Yard fatalities are reported exceptionally high in the smaller towns, a trend which is leading to serious concern for the future of scrap distribution, perhaps when most needed. Salvage drives, which are making rather poor showings this year as compared with last, are credited with having anticipated the obsolescence of material thus draining off scrap earlier which otherwise might only now be coming out.

This early drafting of accessible scrap plus the heavy restrictions of manpower shortages and limited gasoline supplies in the East have kept collection poor. Likewise, favorable war news reaching the populace daily now has created an optimism which is not conducive to scrap gathering. A New England source reports one street superintendent so disgusted with collections that city trucks were withdrawn from the work. Another instance concerned a police scrap drive that netted only one antiquated watering fountain in a full week's time.

Also adding to the difficulties has been the M-311 order which has slowed auto graveyards to a near halt, hot weather, harvest-busy farmers and a low profit margin in yards. Industrial scrap remains the mainstay of the market although even here some decline has occurred through cut-back manufacturing programs. New steel facilities on the West Coast are said to be draining the huge surpluses there and lessening the amounts usually shipped inland. More Army scrap is reported entering the country at New York and shipyard scrap has held at about its usual volume.

●

NEW YORK — There has been no change in scrap this week except that there is less scrap in dealers' yards. Mills are now getting producers scrap. The supply of No. 2 scrap has completely dried up since auto-graveyards are not touching their increasing stockpiles. Should mills suddenly call for more scrap, as occurred in Pittsburgh last week, it is doubtful whether there would be enough to meet such an emergency.

●

ST. LOUIS—Receipts of scrap in the St. Louis industrial area continue light and mills are getting anxious about their supplies through the rest of the Summer. It is estimated that 40 per cent of Army scrap coming in is agricultural and the remainder sheet iron; a better quality.

●

BIRMINGHAM—Movement of scrap in the Birmingham district remains stagnant and there is no indication of any immediate improvement. Dealers' yards are the cleanest in years.

●

CINCINNATI — With the flow into yards from local sources sharply decreased, brokers indicate a modest interest on the part of users for remote material. Heretofore, the high freight rates have caused consumers to resist such offerings, but with the continued warning of a possible pinch later on in the year, mill reluctance to remote scrap is easing. Country scrap flow is low.

●

BUFFALO—The scrap situation remained quiet this week, with supplies plentiful and buyers continuing to reject light stuff in the hope of smoking out heavier stock. One consumer took in only 200 tons of scrap during the week, complaining that most offerings were of poor quality. An increase in scrap tonnage via the barge canal also was noted.

●

BOSTON—Activity among yards and brokers is confined to regular customers; no new accounts are being solicited; comparatively little scrap is coming out so accumulations in yards are very slow. The allotment of carlots of shipyard scrap is still a big factor in the market. Allotments from the Fore River and Bethlehem-Hingham shipyards were numerous the past week.

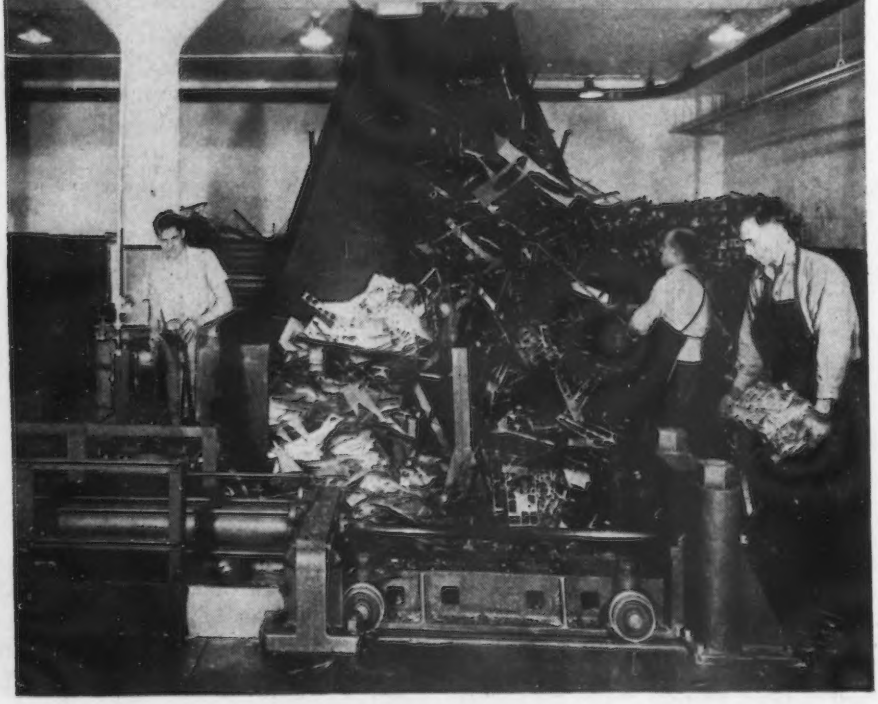
●

PHILADELPHIA—Less scrap is coming into dealers' yards. The serious manpower shortage and the gasoline situation have discouraged many dealers from going out in search of scrap that is around the district. Very little scrap is coming out of auto-graveyards now that wreckers have to be careful to salvage usable parts. They are not touching the autos piling up in the graveyards. Mills are getting the scrap they want, but this is mostly industrial material. Some electric furnaces are now taking low phos grades. Max Bailis Sons Co. was high bidder at $14.89 a gross ton for the 1000 tons of mixed ferrous and non-ferrous scrap that was sold last week by the Philadelphia Navy Yard.

●

PITTSBURGH—Movement of substantial quantities of scrap to the largest outlet here is still in progress, and in consequence supply of blast furnace and open hearth grades continues smaller than overall demand. Short turnings are hard to locate. No improvement of the tightened situation is immediately in sight, for cleanup of the special buying mentioned will not end above-average requirements of most mills, seeking to enlarge stockpiles after the drains caused by the coal strikes.

SCRAP SALVAGE ON THE PRODUCTION LINE: Scrap metal collected from around machines in a Curtiss-Wright plant is wheeled to this chute and dumped through overhead trap doors to workers. These chutes empty near a briquetting machine where the scrap is compressed into easily-handled bricks for shipment.



IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH GRADES		BLAST FURNACE GRADES				ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES									
							Low Phos.		Heavy Structural and Plate			Foundry Steel				
	No. 1 & 2 Hvy. Melt. No. 1 Cp. Blk. Shts. No. 1 & 2 Bundles No. 1 Busheling	Unbaled* Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shoveling Turnings	No. 2 Busheling	Billet, Bloom, Forge Crops	Bar Crops, Punchings Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crankshafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$15.00	$15.00	$16.00	$17.00	$17.50	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	19.75
Ashland, Ky.	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	12.85	12.85	13.85	14.85	15.35	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	18.85
Toledo, Ohio	.....	12.85	12.85	13.85	14.85	15.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis, Mo.	17.50	12.50	12.50	13,50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles; Pittsburg, Cal.; San Francisco	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.00	15.00	12.50	14.00	15.50

*Baled turnings are $5 per gross ton higher.

BUNDLES: Tin can bundles are $4 below dealers' No. 2 bundles No. 3 bundles are $2 less than No. 1 heavy melting.

AT NEW YORK city or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Minimum set at $14 per gross ton at any shipping point in U. S. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.66 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing points (cents per gross ton) are: Pittsburgh, Brackenridge, 55c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, 42c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Harrisburg, Phoenixville, Bethlehem, Kokomo, Duluth, St. Louis, 28c.; Buffalo, Claymont, 36c.; Conshohocken, 11c.; Atlanta, Birmingham, 32c.; Pittsburg, Cal., 42c.; Middletown, 14c.; Sparrow's Point, 11c.; Chicago, 84c.; Detroit, 53c.; Alabama City, 26c.; Minnequa, 22c.; Seattle, 38c. *At Cincinnati, for basic open hearth grades, foundry steel and auto springs and crankshafts, deduct 80c. per ton.

PITTSBURGH basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakmont, Cal. Claymont, Del., includes the switching point of Chester, Pa. Chicago includes Gary, Ind., switching district.

MAXIMUM SHIPPING POINT PRICE—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing point, the price in table above at the most favorable basing point minus the lowest transportation charge by rail or water or combination thereof. In lieu of dock charge add 75c. a ton*, but 50c. if moved by deck scow or railroad lighter. Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points take price listed in table minus applicable switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.* For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be $3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made $4) less maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge $2.50 per ton on consumer-owned unprepared remote scrap (see order). A preparation-in-transit charge for allocated unprepared scrap is provided.

NEW LISTED GRADES: Priced in dollars per gross ton less than No. 1 heavy melting steel. Pit scrap, ladle skulls, slag reclaim, etc., of 85% or more Fe priced—$2; 75 to 85% Fe—$4; under 75% Fe—$8 per ton. Mill scale of 65% or more Fe—$8 per ton. Mill cinder and grindings, shipping point maximum price of $4 per gross ton at all U. S. shipping points.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1 per cent oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5 per cent oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c.

*At Memphis 50c.: Great Lakes ports $1; New England $1.25.

RAILROAD SCRAP

	No. 1 RR Heavy Melting	Scrap Rails	Rails for Rerolling	Scrap Rails: 3 ft. and Under	Scrap Rails: 2 ft. and Under	Scrap Rails: 18 in. and Under
Cleveland, Cincinnati, Ashland, Portsmouth, Middletown	$20.50	$21.50	$23.00	$23.50	$23.75	$24.00
Canton, Pittsburgh, Sharon, Steubenville, Wheeling, Youngstown	21.00	22.00	23.50	24.00	24.25	24.50
Chicago, Philadelphia, Sparrows Pt., Wilmington	19.75	20.75	22.25	22.75	23.00	23.25
Birmingham, Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
Kokomo, Ind.	19.25	20.25	21.75	22.25	22.50	22.75
Seattle	15.50	16.50	18.00	18.50	18.75	19.00
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00

CAST IRON SCRAP

	Group A	Group B	Group C
No. 1 cupola cast	$18.00	$19.00	$20.00
Clean auto cast	18.00	19.00	20.00
Unstripped motor blocks	15.50	16.50	17.50
Stove Plate	17.00	18.00	19.00
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Misc. Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C: States not named in A and B; switching district of Kansas City, Kan., Mo.

Tool Steel Scrap Ceiling Prices Set by MPR 379, May 4, 1943

BASE PRICE SEGREGATED	Solids, Lb. Cont. W	Turnings, Lb. Cont. W
Type 1	$1.80	$1.60
Type 2	1.60	1.40
Type 3	1.25	1.25
Type 4*	0.125	0.105
Type 5*	0.135	0.115

*Per lb. of scrap material.

BASE PRICE UNSEGREGATED SOLIDS

$1.50 per lb. contained W if 5% or more.

$1.15 per lb. contained W if over 1% and less than 5%.

$0.80 per lb. contained Mo if 1½% or more.

BASE PRICE UNSEGREGATED TURNINGS

$1.30 per lb. contained W if 5% or more.

$1.00 per lb. contained W if 1% and less than 5%.

$0.70 per lb. contained Mo if 1½% or more.

Comparison of Prices . . .

Advances Over Past Week in **Heavy Type**; Declines in *Italics*. [Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	July 20, 1943	July 13, 1943	June 22, 1943	July 21, 1942
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	July 20, 1943	July 13, 1943	June 22, 1943	July 21, 1942
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.89	$25.89
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	24.68	24.68	24.68	24.68
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.39	25.39	25.39	25.39
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	31.34	31.34	31.34	31.34
Ferromanganese	135.00	135.00	135.00	135.00
Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$6.50	$6.50	$6.50	$6.00
Foundry coke, prompt	7.50	7.375	6.875	6.875
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	22.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 143 to 150.

Composite Prices . . .

	FINISHED STEEL	PIG IRON	SCRAP STEEL
July 20, 1943	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26190c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1943	2.25513c.,	2.25513c.,	$23.61	$23.61	$19.17	$19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 9
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

. . . Prices of Finished Iron and Steel

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, reductions, and in most cases freight absorbed to meet competition. Delivered prices do not reflect new 3 per cent tax on freight rates.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars[10]	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long ternes[2]	3.80¢		3.80¢									4.55¢		4.16¢	4.12¢
STRIP															
Hot rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢	3.16¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢	3.31¢	
TIN MILL PRODUCTS															
Coke tin plate, base box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
Electrolytic tin plate, box	$4.50	4.05¢	$4.50												
Black plate, 29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[12]			3.37¢
Mfg. ternes, special box	$4.30	$4.30	$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢[13]	2.25¢	2.39¢	
Reinforcing (rail)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢[13]	2.25¢		2.47¢
Cold finished[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70¢)					2.99¢	2.97¢
Alloy, hot rolled	2.70¢	2.70¢				2.70¢	(Bethlehem, Massillon, Canton = 2.70¢)						2.80¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
								(Coatesville and Claymont = 2.10¢)							
PLATES															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.35¢		2.45¢	2.65¢	2.31¢	2.29¢	2.15¢
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3.67¢
Alloy	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.95¢	4.15¢		3.70¢	3.59¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem = 2.10¢)				2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
WIRE[9]															
Bright[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)					3.10¢			2.92¢
Galvanized	add proper size extra and galvanized extra to bright wire base, above.														
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.70¢			3.52¢
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

[1] Mill run sheets are 10c, per 100 lb. less than base; and primes only, 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to certain width and length limitations. [6] For merchant trade. [7] Prices for straight length material only, from a producer to a consumer. Functional discount of 25c. per 100 lb. to fabricators. [8] Also shafting. For quantities of 20,000 to 29,999 lb. [9] Carload lot to manufacturing trade. [10] These prices do not apply if the customary means of transportation (rail and water) are not used. [12] Boxed. [13] Portland and Seattle price, San Francisco price is 2.50c. [14] This bright wire base price to be used in figuring annealed and bright finish wires, commercial spring wire and galvanized wire.

GOVERNMENT CEILING—Price Schedule No. 6 issued April 16, 1941, governs steel mill prices; Price Schedule No. 49 governs warehouse prices which are on another page of this issue.

EXCEPTIONS TO PRICE SCHEDULE No. 6—On hot rolled carbon bars, Phoenix Iron Co. may quote 2.35c. at established basing points, Calumet Steel division of Borg Warner may quote 2.35c., Chicago, on bars from its 8-in. mill; Joslyn Mfg. Co. may quote 2.35c., Chicago base. On rail steel bars Sweets Steel Co. may quote 2.35c., f.o.b. mill. On hot rolled sheets, Andrews Steel Co. may quote for shipment to Detroit area on Middletown base. On galvanized sheets, Andrews Steel may quote 3.75c., at established basing points. On hot rolled strip, Joslyn Mfg. Co. may quote 2.30c., Chicago base. On plates, Granite City Steel Co. may quote 2.35c., f.o.b. mill, and Central Iron & Steel Co. may quote 2.20c., f.o.b. basing points. On shapes, Phoenix Iron Co. may quote 2.30c. established basing points and 2.50c. Phoenixville for export.

On rail steel merchant bars, Eckels-Nye Corp. may charge 2.40c. On tubing, South Chester Tube Co. may price Gulf or Pacific Coast all-rail shipments and shipments west of Harrisburg on basis of f.o.b. Chester. On lend-lease sales to eastern seaboard, Sheffield Steel Co. and Colorado Fuel & Iron Corp. may sell f.o.b. mill. SEMIFINISHED STEEL—Follansbee Steel Corp. may sell forging billets at $49.50 f.o.b. Toronto; Continental Steel Corp. may sell Acme Steel Co. at $34 for rerolling billets plus extras and freight; Ford Motor Co. may sell rerolling billets at $34 f.o.b. Dearborn; Andrews Steel Co. may sell forging billets at $50 at established basing points and slabs at $41; Empire Sheet and Tin Plate may sell slabs at $41 at established basing points and sheet bars at $39 f.o.b. mill; on lend-lease sales Northwestern Steel & Wire Co. may charge $41 per gross ton f.o.b. mill for rerolling billets; on lend-lease sales Wheeling Steel Corp. may charge $36 per ton for small billets, f.o.b. Portsmouth and $37 per ton for sheet bars f.o.b. Portsmouth; Laclede Steel Co. on semifinished sales for lend-lease shipped to eastern seaboard may use Chicago basing point prices f.o.b. Alton and Madison, Ill. ALLOY STEEL BARS—Texas Steel Co. may use Chicago base f.o.b. Fort Worth.

WAREHOUSE PRICES

(Delivered Metropolitan areas, per 100 lb. These prices do not necessarily apply for dislocated tonnage shipments when the f.o.b. City prices are used in conformance with OPA Schedule 49)

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	†† Hot Rolled, 2300	‡ Hot Rolled, 3100	†† Cold Drawn, 2300	‡ Cold Drawn, 3100
*Philadelphia	$3.518	$4.872[5]	$5.018	$3.922	$4.772	$3.605	$3.666	$3.822	$4.072	....	$7.116	....	....
*New York	3.590	4.613[2]	5.010	3.974[6]	4.774	3.768	3.758	3.853	4.103	6.008	7.158	7.303	8.453
*Boston	3.774	4.744	5.224	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.312	7.344	8.494
*Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
*Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165	....	....	....	....
*Washington	3.596	4.841	5.196	4.041	4.741	3.796	3.930	3.941	4.041	....	....	....	....
*Chicago	3.25	4.20	5.234	3.60	4.655	3.55	3.55	3.50	3.75	5.75	6.90	6.85	8.00
*Milwaukee	3.387	4.337[2]	5.272[4]	3.737	4.787[8]	3.687	3.687	3.637	3.887	5.987	7.137	7.087	8.237
*Cleveland	3.35	4.40	4.977	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.106	6.85	8.00
*Buffalo	3.35	4.40	4.754	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.90	6.85	8.00
*Detroit	3.45	4.50	5.004	3.70	5.909[8]	3.609	3.661	3.45	3.80	6.08	7.23	7.159	8.309
*Cincinnati	3.425	4.475[2]	4.825[1]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
*St. Louis	3.397	4.247[2]	5.172[4]	3.747	4.931[8]	3.697	3.697	3.647	4.031	6.131	7.281	7.231	8.381
*Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	7.15	6.85	8.25
St. Paul	3.50	4.35	5.00	3.85	3.83	3.80	3.80	3.75	4.34	7.45	6.00	8.84	7.44
*Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.443	....	....	....	....
*Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.58	3.98	6.08	7.23	7.18	8.33
Birmingham	3.45[3]	....	4.75[1]	3.70[3]	....	3.55[3]	3.55[3]	3.50[3]	4.43	....	....	....	....
Memphis	3.85	4.66	5.25	4.10	....	3.95	3.95	3.90	4.31	....	....	....	....
New Orleans	3.95	4.95	5.25	4.20	....	3.90	3.90	4.10	4.60	....	....	....	....
Houston	3.75	5.43	5.25	4.30	....	5.25	5.25	3.75	4.50	....	....	....	....
†Los Angeles	4.95	7.15	5.95	4.90	....	4.90	4.60	4.35	5.70	9.55	8.55	10.55	9.55
†San Francisco	4.55	7.55	6.60	4.50	....	4.65	4.35	3.95	5.55	9.80	8.80	10.80	9.80
†Seattle	4.65[7]	6.63	5.70[7]	4.25	....	4.75	4.45	4.20	5.75	....	8.00	....	....

NATIONAL EMERGENCY (N. E.) STEELS

(Hot Rolled Mill Extras for Alloy Content)

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar Strip	Billets, Blooms and Slabs	Bars and Bar Strip	Billets, Blooms and Slabs
NE 1330	.28/ .33	1.60/1.90	.040	.040	.20/ .35	....	....	....	.10c	$2.00	....	....
NE 1335	.33/ .38	1.60/1.90	.040	.040	.20/ .35	....	....	....	.10	2.00	....	....
NE 1340	.38/ .43	1.60/1.90	.040	.040	.20/ .35	....	....	....	.10	2.00	....	....
NE 1345	.43/ .48	1.60/1.90	.040	.040	.20/ .35	....	....	....	.10	2.00	....	....
NE 1350	.48/ .53	1.60/1.90	.040	.040	.20/ .35	....	....	....	.10	2.00	....	....
NE 8020	.18/ .23	1.00/1.30	.040	.040	.20/ .35	....	....	.10/ .20	.45	9.00	.95c	$19.00
NE 8442*	.40/ .45	1.30/1.60	.040	.040	.20/ .35	....	....	.30/ .40	.90	18.00	1.40	28.00
NE 8613	.12/ .17	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8615	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8617	.15/ .20	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8620	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8630	.28/ .33	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8635	.33/ .38	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8637	.35/ .40	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8640	.38/ .43	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8642	.40/ .45	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8645	.43/ .48	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8650	.48/ .53	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8720	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.20/ .30	.80	16.00	1.30	26.00
NE 9255	.50/ .60	.70/ .95	.040	.040	1.80/2.20	....	....	....	.40c	8.00	....	....
NE 9260	.55/ .65	.75/1.00	.040	.040	1.80/2.20	....	....	....	.40	8.00	....	....
NE 9262	.55/ .65	.75/1.00	.040	.040	1.80/2.20	.20/ .40	....	....	.65	13.00	....	....
NE 9415	.13/ .18	.80/1.10	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30c	$26.00
NE 9420	.18/ .23	.80/1.10	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30	26.00
NE 9422	.20/ .25	.80/1.10	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30	26.00
NE 9430	.28/ .33	.90/1.20	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30	26.00
NE 9435	.33/ .38	.90/1.20	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30	26.00
NE 9437	.35/ .40	.90/1.20	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30	26.00
NE 9440	.38/ .43	.90/1.20	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30	26.00
NE 9442	.40/ .45	1.00/1.30	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.85	17.00	1.35	27.00
NE 9445	.43/ .48	1.00/1.30	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.85	17.00	1.35	27.00
NE 9450	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.85	17.00	1.35	27.00
NE 9537*	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9540*	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9542*	.40/ .45	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9550*	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9630	.28/ .33	1.20/1.50	.040	.040	.40/ .60	.40/ .60	....	....	.80	16.00	1.30	26.00
NE 9635	.33/ .38	1.20/1.50	.040	.040	.40/ .60	.40/ .60	....	....	.80	16.00	1.30	26.00
NE 9637	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	....	....	.80	16.00	1.30	26.00
NE 9640	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60	....	....	.80	16.00	1.30	26.00
NE 9642	.40/ .45	1.30/1.60	.040	.040	.40/ .60	.40/ .60	....	....	.85	17.00	1.35	27.00
NE 9645	.43/ .48	1.30/1.60	.040	.040	.40/ .60	.40/ .60	....	....	.85	17.00	1.35	27.00
NE 9650	.48/ .53	1.30/1.60	.040	.040	.40/ .60	.40/ .60	....	....	.85	17.00	1.35	27.00

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb.; galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over: Exceptions: [1] 500 to 1499 lb. [2] 400 to 1499 lb. [3] 400 to 3999 lb. [4] 450 to 1499 lb. [5] 1000 to 1999 lb. [6] 0 to 1999 lb. [7] 300 to 10,000 lb. [8] 2000 to 39,999 lb. At Philadelphia galvanized sheets, 2500 more bundles; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; San Francisco, hot rolled sheets, 400 to 39,999 lb.; galvanized and cold rolled sheets, 750 to 4999 lb.; cold fin. bars, 0-299 lb.; hot rolled alloy bars, 0-4999 lb.; Seattle, cold finished bars, 1000 lb. and over, hot rolled alloy bars, 0-1999 lb.; Memphis, hot rolled sheets, 400 to 1999 lb., galvanized sheets, 150 and over; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, hot rolled sheets, bars, plates, cold rolled sheets, 300 to 1999 lb.; galvanized sheets, 1 to 6 bundles; cold finished bars, 1 to 99 lbs.; SAE bars, 100 lb. Extras for size, quality, etc., apply on above quotations.

† Los Angeles, San Francisco and Seattle prices reflect special provisions of amendment No. 2 to OPA Price Schedule No. 49.

†† For zoned cities these grades have been revised to NE 8617-20.

‡ For zoned cities these grades have been revised to NE 9442-45 Ann'ld.

* Base delivered prices according to price zones established by Amendments to RPS 49 including the 3% transportation tax—not including the 6% freight increase of March 18, 1942, rescinded May 15, 1943.

***Recommended for large sections only. Note: The extras shown above are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, $5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.**

PRICES

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; f.o.b. Duluth, billets only, $2 higher. Delivered prices do not reflect new per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00
Alloy Steel: Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton	$54.00

Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi, 3c. higher.

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 202
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

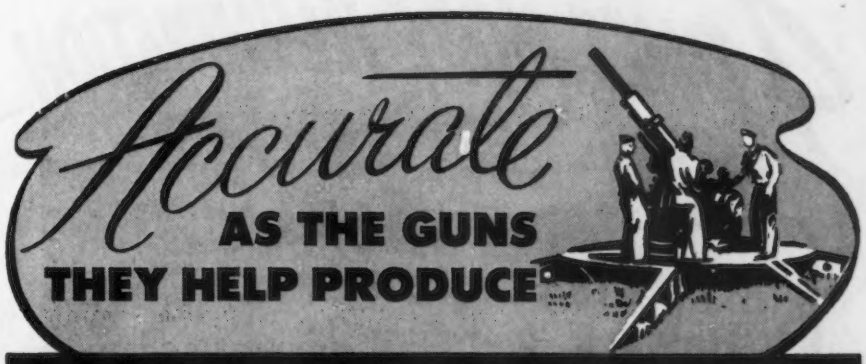
Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hotstrip	17.00c.	17.50c.	24.00c.	35.00c.
Cold st.	22.00c.	22.50c.	32.00c.	52.00c.

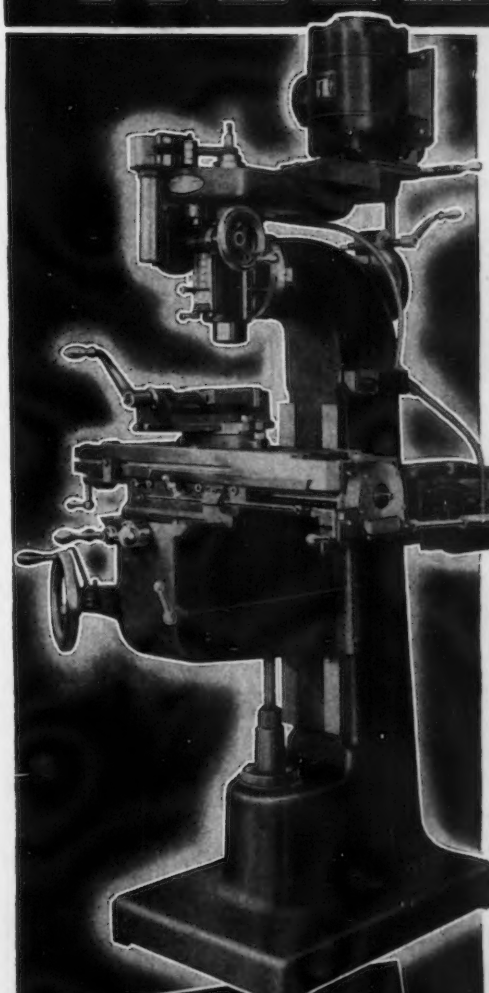
Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.



INDEX MILLS



Manufactured by Index Machine and Tool Co., Jackson, Michigan.

CHECK THESE FEATURES!

★ Precision Ball Bearing Spindle that will require no attention for two years.

★ Swivel Head which can be set 90° right or left.

★ Super construction sensitive enough to do work with end mills 1/8" diameter yet rugged enough to use 3/4" end mills taking full cuts 24 hours a day.

★ Verniers for locating, and power feed to spindle for boring.

★ A versatile machine that can be used in the tool room or on the production line.

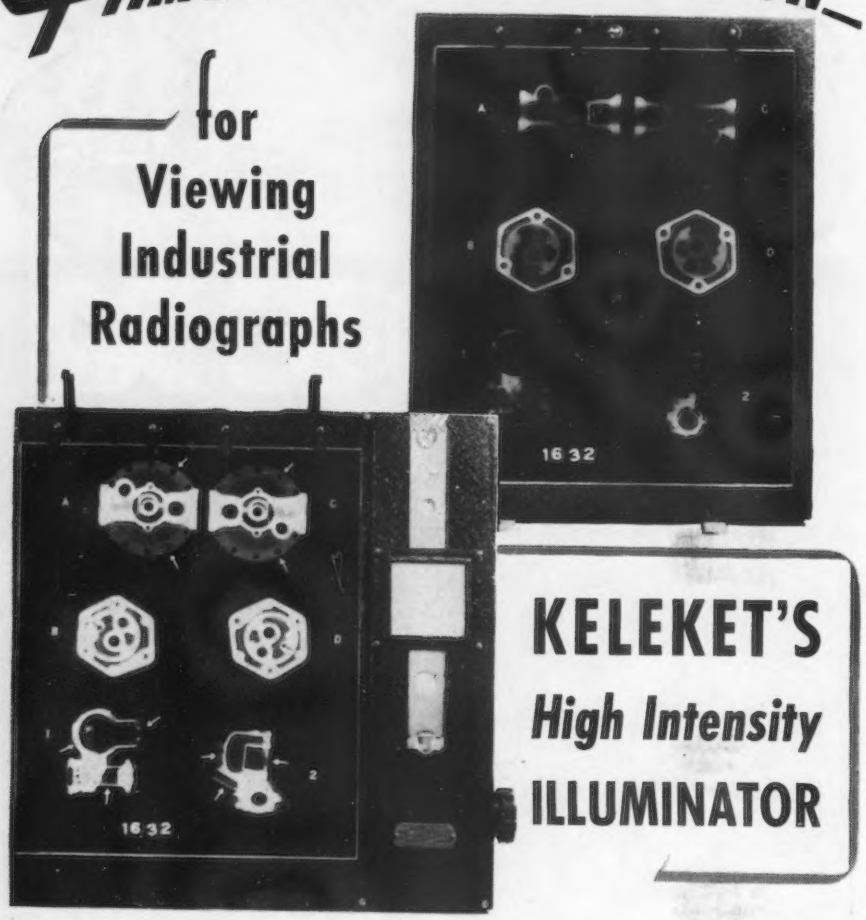
Send inquiries for immediate quotation and quick delivery to Factory Sales and Distributing Agents.

BLANK and BUXTON MACHINERY

3100 E. MICHIGAN AVE.
JACKSON, MICHIGAN

4 TIMES MORE ILLUMINATION

for Viewing Industrial Radiographs



KELEKET'S *High Intensity* ILLUMINATOR

The two illustrations above show the same X-ray film viewed first on an ordinary illuminator and then on the KELEKET High Intensity Illuminator. Arrows indicate the critical areas that pass unseen on the ordinary illuminator even though they definitely exist on the film, and can be seen with adequate illumination.

The KELEKET High Intensity Illuminator provides a full 14″ x 17″ front surface that allows the largest films to be viewed at one glance. With smaller films masking reduces the illuminated front to the desired size. For detailed inspection of *any critical area* the 3″ spot is used, where 4 times the intensity of the large front surface easily illuminates films up to density 4.5.

Illumination on both the 14″ x 17″ surface and the 3″ spot is controlled by a stepless voltage regulator which selects any degree of intensity desired from zero to the maximum.

For more detailed information write for Catalog F-11.

KELLEY-KOETT X-RAY MFG. COMPANY
2307 WEST FOURTH ST., COVINGTON, KY.

PIONEER CREATORS OF QUALITY X-RAY EQUIPMENT SINCE 1900

PRICES

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

	Per Cent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all length	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:
(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
7/16 in. and smaller	..	64
½ in. and smaller	62	..
⅝ in. through 1 in.	..	60
9/16 to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full container lots, 10 per cent additional discount.

Stove Bolts

Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets *(½ in. and larger)*

	Base per 100 lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets *(7/16 in. and smaller)*

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws

	Per Cent Off List
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Filister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, heavier than 60 lb., gross ton	$40.00
Angle bars, 100 lb.	2.70
(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00

	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plates, steel	2.15c.
Tie plates, pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing Points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

PRICES

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)	*Per Lb.*
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham

	Base per Keg
Standard wire nails	$2.55
Coated nails	2.55
Cutnails, carloads	3.85
	Base per 100 Lb.
Annealed fence wire	$3.05
Annealed galvanized fence wire	3.40
	Base Column
Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	59
Galvanized barbed wire†	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$200 per Net Ton

Steel (Butt Weld)

	Black	*Galv.*
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½

Wrought Iron (Butt Weld)

½ in.	25	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18

Steel (Lap Weld)

2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½

Wrought Iron (Lap Weld)

2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17

Steel (Butt, extra strong, plain ends)

	Black	*Galv.*
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57

Wrought Iron (Same as Above)

½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½

Steel (Lap, extra strong, plain ends)

2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56

Wrought Iron (Same as Above)

2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

MAN BURIED ALIVE IN COAL CHUTE

The life of [redacted] was miraculously saved when he was buried under five feet of coal for several hours in a hopper at the power pla[redacted]

He had been attempting to break up the bridging or arching of coal in one of the bunkers leading to the mechanical stokers. Contrary to safety regulations, he had gone onto the top of the coal surface without first having a rope, with a second man on the catwalk to attend the line.

It can't happen here!

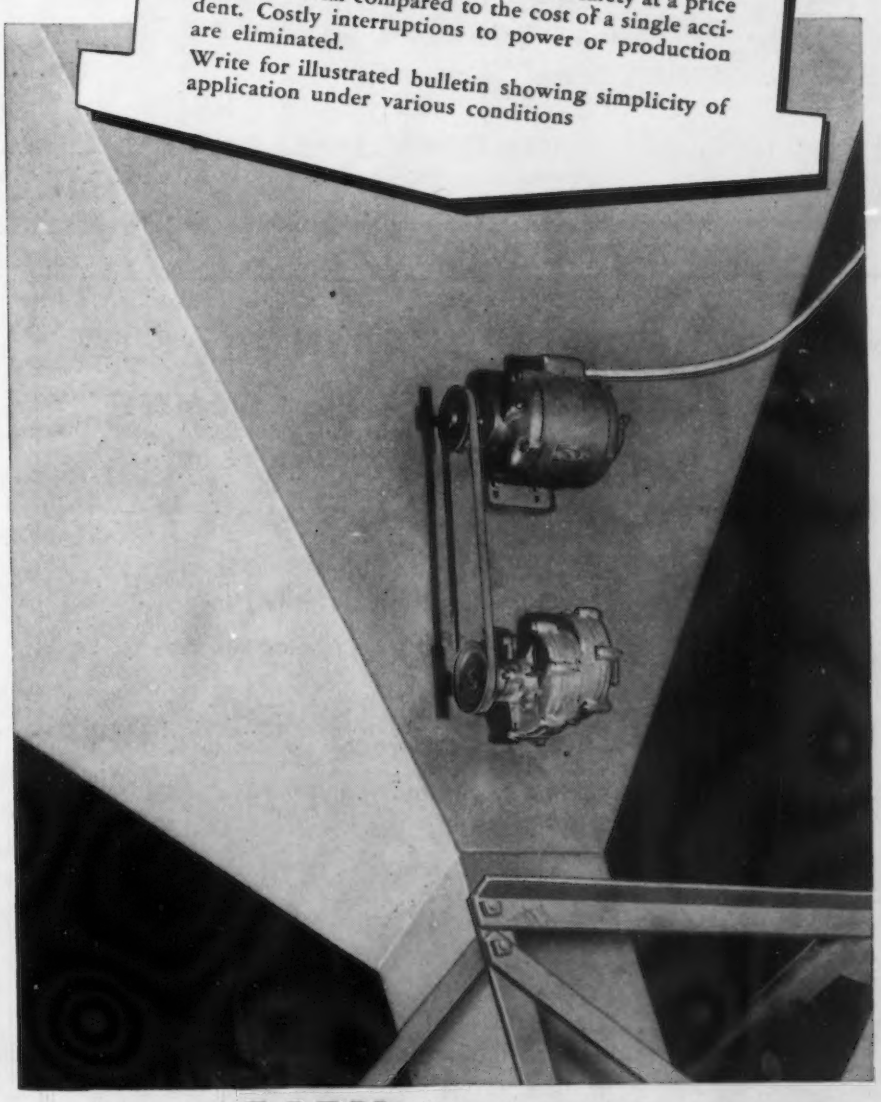
AJAX SHAKER PREVENTS BRIDGING

● Application of vibration to the side of hopper carrying bulk materials to constricted outlet eliminates hazardous bridging or arching.

The angle of slide is maintained, thus eliminating flow stoppage due to compacting of material at narrow outlet of hopper.

Application of Ajax Shakers provides safety at a price which is trivial compared to the cost of a single accident. Costly interruptions to power or production are eliminated.

Write for illustrated bulletin showing simplicity of application under various conditions



AJAX FLEXIBLE COUPLING CO.

Incorporated 1920 **WESTFIELD, N. Y.**

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston††	*$25.00*	*$24.50*	*$26.00*	*$26.50*	.....	.....
Brooklyn	*27.50*	.....	.....	*28.00*	.....	.....
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*	.....	.....
Philadelphia	*25.84*	*25.34*	*26.84*	*26.34*	*$30.74*	.....
Bethlehem, Pa.	25.00	24.50	26.00	25.50	.....	.....
Everett, Mass.††	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.	.....	24.50	.....	.....	29.50	.....
Birdsboro, Pa.	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50	.....	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpsville, Pa.*	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.00	25.00	24.50	29.50	.....
Cincinnati, Ohio	*23.94*	*23.94*	.....	*25.11*	.....	.....
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	*32.69*	.....
Mansfield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	*32.86*	.....
St. Louis	*24.50*	*24.50*	.....	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	*35.46*	*$31.34*
Granite City, Ill.	24.00	23.50	24.50	24.00	.....	.....
Cleveland	24.00	23.50	24.50	24.00	*22.42*	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown*	24.00	23.50	24.50	24.00	*22.42*	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	$28.00
Lyles, Tenn. fc.†	.....	.....	.....	.....	.....	33.00
St. Paul	*26.76*	.....	*27.26*	*26.76*	*39.80*	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.00	.....	.....	.....
Los Angeles	*26.95*	.....	.....	.....	.....	.....
San Francisco	*26.95*	.....	.....	.....	.....	.....
Seattle	*26.95*	.....	.....	.....	.....	.....
Provo, Utah	22.00	21.50	.....	.....	.....	.....
Montreal	*27.50*	*27.50*	.....	*28.00*	.....	.....
Toronto	*25.50*	*25.50*	.....	*26.00*	.....	.....

GRAY FORGE IRON: Valley or Pittsburgh furnace $23.50

*Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

**Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

†Price shown is for low-phosphorous iron; high-phosphorous sells for $28.50 at the furnace.

††Eastern Gas & Fuel Associates, Boston, is permitted to sell pig iron produced by its selling company, Mystic Iron Works, Everett, Mass., at $1 per gross ton above maximum prices.

Delta Chemical & Iron Co., Chicago, may charge $30 for charcoal iron at its Delta, Mich., furnace.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 per cent to 2.25 per cent); phosphorous differentials, a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over; manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

BRONZE BEARINGS
OILLESS BRONZE BEARINGS
GEAR BLANKS
MACHINED BRONZE PARTS

S & H Bronze Bearings can be furnished in any size or quantity to meet your particular requirements.

Our equipment and manufacturing methods enable us to meet the most exacting specifications and design.

INDUSTRIAL BEARINGS

BETTER B BEARINGS

S. & H. Bearing and Manufacturing Co., Inc.
340-344 North Avenue, East
Cranford New Jersey

Metal Powders

Prices are based on current market prices of ingots plus a fixed figure. For ton lots f.o.b. shipping point, in cents per lb.

Copper, electrolytic, 150 and 200 mesh	21⅛ to 23⅛c.
Copper, reduced, 150 and 200 mesh	20½ to 25⅛c.
Iron, commercial, 100 and 200 mesh	13½ to 15c.
Iron, crushed, 200 mesh and finer	4c.
Iron, hydrogen reduced, 300 mesh and finer	63c.
Iron, electrolytic, unannealed, coarser than 300 mesh	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh	42c.
Iron, carbonyl, 300 mesh and finer	90c.
Aluminum, 100 and 200 mesh.	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.03
Lead, 100, 200 & 300 mesh,	11½ to 12½c.
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51½c.
Solder powder, 100 mesh,	8½c. plus metal
Tin, 100 mesh	58¾c.

*Freight allowed east of Mississippi.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless Cold Drawn	*Seamless Hot Rolled*	*Lap Weld, Hot Rolled*
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft., and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2.000 lb. or ft.	65%

PRICES

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports**)

	Per Gross Ton
Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorous, 51.50	4.35

*Adjustments are made to indicated prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

COKE

Furnace

	Per Net Ton
†Connellsville, prompt	$6.50*

Foundry

†Connellsville, prompt	$7.50
Fayette County, W. Va. (Beehive)	$8.10
By-product, Chicago	$12.25
By-product, New England	$13.75
By-product, Newark	$12.40 to $12.95
By-product, Philadelphia	$12.38
By-product, Cleveland	$12.30
By-product, Cincinnati	$11.75
By-product, Birmingham	$8.50†
By-product, St. Louis	$12.02
By-product, Buffalo	$12.50

Maximum by-product coke prices established by OPA became effective Oct. 1, 1941.

*Hand-drawn ovens using trucked coal are permitted to charge $7.00 per net ton, plus usual transportation. Maximum beehive furnace coke prices established by OPA, Feb. 8, 1942. †F.o.b. oven.

FLUORSPAR

	Per Net Ton
Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail	$33.00
Domestic, f.o.b. Ohio River landing barges	33.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines	33.00

REFRACTORIES

(*F.o.b. Works*)

Fire Clay Brick	*Per 1000*
Super-duty brick, St. Louis	$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.60

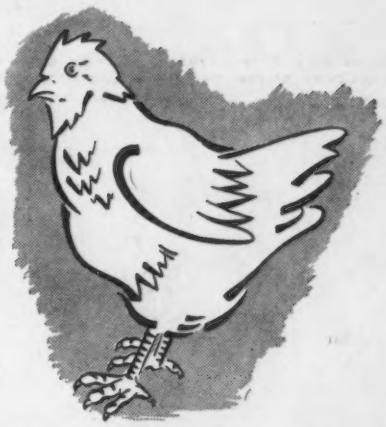
Silica Brick	
Pennsylvania & Birmingham	$51.30
Chicago District	58.90
Silica cement, net ton (Eastern)	9.00

Chrome Brick	*Per Net Ton*
Standard, chemically bonded, Balt., Plymouth Meeting, Chester	$54.00

Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$44.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

How many FEATHERS in a Hen?



Our department of weights and standards, after plucking several specimens, has placed the problem back in our laps with no answer.

Many spring users have placed spring problems hard to solve in our hands to analyse and standardize. Scientific control of materials, close supervision of manufacture, automatic heat-treating, and accurate inspection and testing will give your springs a uniform degree of performance that eliminates kick-backs.

Buy springs that give known performance!

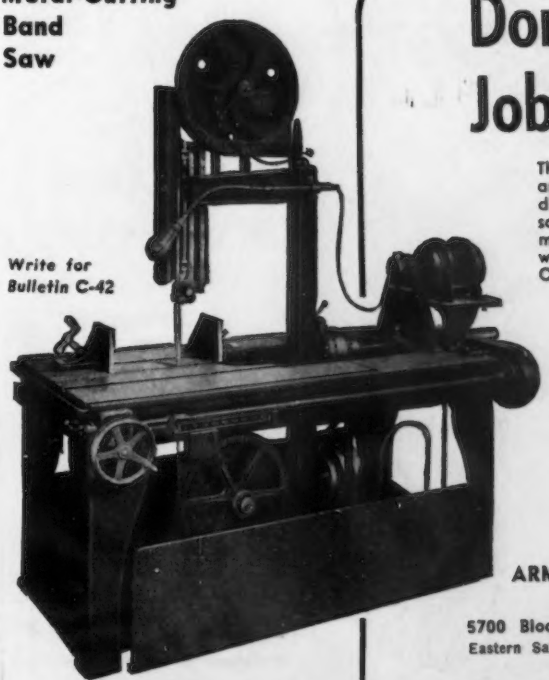
DUNBAR SPRINGMAKERS

SPRINGS WIRE FORMS SMALL STAMPINGS

DUNBAR BROS. CO., Bristol, Conn.

Division of Associated Spring Corporation

Marvel No. 8 *Metal-Cutting* Band Saw



Write for Bulletin C-42

Doing its War Job Well!

The busiest tool in the tool rooms, an essential tool in the complete die shop and a time and money saver in the maintenance department, because "it does all things well." The MARVEL No. 8 Metal Cutting Band Saw (capacity 18" x 18") will snip off an 1/8" drill rod, rough out the largest billet or cut a perfect 45° mortice on the end of a large I-beam without any special setting-up. Its large planer type bed takes all work. Its continuous blade feeds into the work at any angle from 45° right to 45° left. It has a large removable vise and a combination hand and/or power feed.

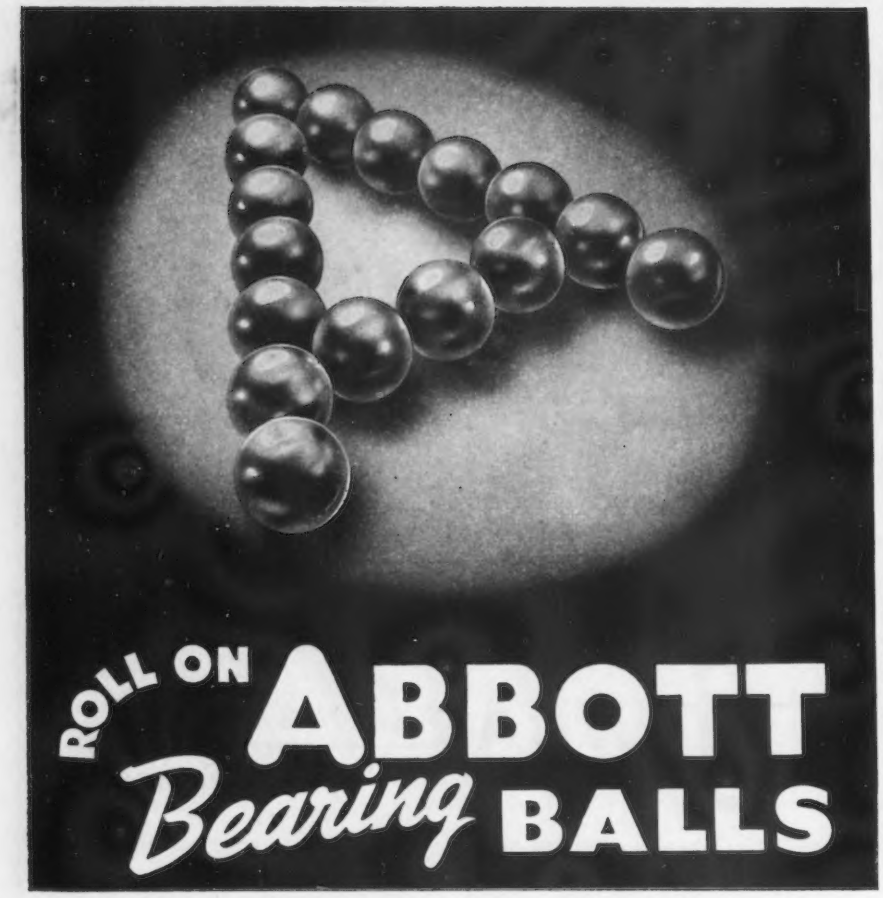
ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave., Chicago, U.S.A.

Eastern Sales Office: 225 Lafayette St., New York

MARVEL SAWS



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Atlas

BENCH MILLING MACHINE

Handles everything from slabbing and facing cuts to end milling, keyway cutting, finishing and layout work. Ideal for tool-room or production shop. Operates from 1/3 HP motor. Table surface 4½" x 18". Available with hand operated controls, rapid production levers, or "Change-O-Matic" for instant selection of automatic feeds.

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709 N. PITCHER ST. KALAMAZOO, MICH.

LATHES • DRILL PRESSES • ARBOR PRESSES • SHAPERS • MILLING MACHINES

Ferromanganese

78-82% manganese, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Ton lots (packed)	141.00
Less ton lots (packed)	148.50

Premium, $1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Electrolytic Manganese

99.9% manganese, maximum base contract price per lb. of metal, bulk, f.o.b. shipping point, with freight allowed to destination. Size, 1" x D.

	Eastern Zone	Central Zone	Western Zone
Carload lots	37.60c.	37.85c.	38.15c.
l.c.l. lots	39.60c.	38.60c.	40.65c.

Spiegeleisen

Maximum base contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 1% max. Si	19-21% Mn 1% max. Si	26-28% Mn 1% max. Si
Carloads	$41.00	$42.00	$55.50
Less ton	47.50	48.50	62.00

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carlots, f.o.b. shipping point with freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
50% silicon	6.65c.	7.10c.	7.25c.
75% silicon	8.05c.	8.20c.	8.75c.

Spot sales 45c. per lb. higher for 50% Si; 30c. for 75% Si. For extras and premiums see MPR 405.

Silvery Iron

(Per Gross Ton, base 6.00 to 6.50 Si)

F.o.b. Jackson, Ohio	$29.50*
Buffalo	30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorus or over.

*Official OPA price established June 24, 1941.

Bessemer Ferrosilicon

Prices are $1 a ton above Silvery Iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe.	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe.	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% silicon.

	Eastern Zone	Central Zone	Western Zone
Car Lots	3.35c	3.50c.	3.65c.

Spot prices ¼c. higher per lb. of briquet. For premiums and extras see MPR 405.

Silicomanganese

(Per gross ton, delivered, carloads, bulk)

3.00 carbon	$120.00*
2.50 carbon	125.00*
2.00 carbon	130.00*
1.00 carbon	140.00*
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.80c.†
Packed	6.05c.†
Less-ton lots	6.55c.†

*Spot prices are $5 per ton higher.
†Spot prices ¼c. higher.

Ferrochrome

(65-72% Cr, 2% max. Si)

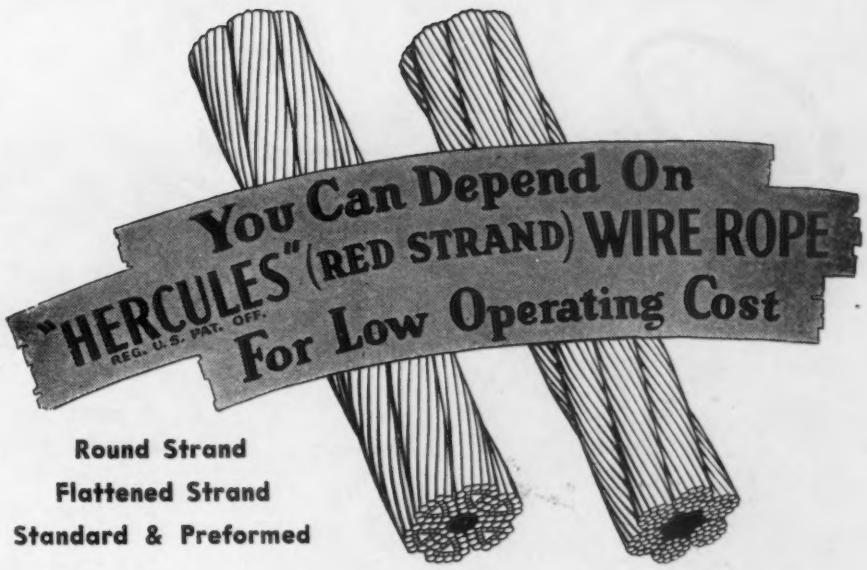
OPA maximum base contract prices per lb. of contained Cr, lump size in carlots, f.o.b. shipping point, freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
0.03% carbon	25.00c.	25.40c.	26.00c.
0.06% carbon	23.00c.	23.40c.	24.00c.
0.10% carbon	22.50c.	22.90c.	23.50c.
1.00% carbon	20.50c.	20.90c.	21.50c.
2.00% carbon	19.50c.	19.90c.	20.50c.

Spot prices are ¼c. higher per lb. contained Cr. For extras and premiums see MPR 407.

Other Ferroalloys

Ferrotungsten, delivered, carlots, per lb. contained tungsten	$1.90
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Ferrovanadium, 35%-40%, contract basis, f.o.b. producers plant, usual freight allowances, open-hearth grade, per lb. contained vanadium	$2.70
Special grade	$2.80
Very special grade	$2.90
Vanadium pentoxide, 88%-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5	$1.10
Ferroboron, contract basis, 17.50 % boron minimum, f.o.b. Niagara Falls, carlots, per lb. alloy	$1.20
Ton lots	$1.25
Silcaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy	23c.
Silvaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy	40c.
Grainal, f.o.b. Bridgeville, Pa., freight allowed 100 lb. and over, maximum based on rate to St. Louis, per lb.	45c.
Bortam, f.o.b. Niagara Falls Ton lots, per lb.	45c.
Less ton lots, per lb.	50c.
Borosil, 3% to 4% boron, 40 to 45% silicon, f.o.b. Philo, Ohio, per pound contained boron	$7.00
Ferrocolumbium, 50% to 60%, f.o.b. Niagara Falls, ton lots, per lb. contained columbium	$2.25
Less-ton lots	$2.30
Ferrotitanium, 40%-45%, f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained titanium	$1.23
Less-ton lots	$1.25
Ferrotitanium, 20%-25%, 0.10 C max., ton lots, per lb. contained titanium	$1.35
Less-ton lots	$1.40
High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore & St. Louis, per gross ton.	$142.50
3%-5% carbon	$157.50
Ferrophosphorus, 18% electric or blast furnace, f.o.b. Anniston, Ala. carlots, with $3 unitage freight equaled with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton	$75.00
Ferromolybdenum, 55-75 per cent, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum	95c.
Calcium molybdate, 40%-45%, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum	80c.
Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo	80c.
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo.	80c.
Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00
Zirconium, 35-40%, contract basis, carloads in bulk or package, per lb. of alloy	15c.
Less-ton lots	16c.
Zirconium, 12-15%, contract basis, carlots, bulk, per gross ton.	$102.50
Packed	$107.50
Less-ton lots	$112.50
Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, per lb.	7.50c.
Ton lots	8c.
Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, carlots, freight allowed, per lb.	10.50c.
Less-ton lots	11c.



Round Strand
Flattened Strand
Standard & Preformed

WHY not let "HERCULES" (Red-Strand) Wire Rope help you meet present day production requirements and still maintain a reasonable margin of profit? You will quickly discover that "HERCULES" is a dependable ally—not only in today's fight against increasing operating costs—but also in your endeavor to speed up production.

Made Only By **A. LESCHEN & SONS ROPE CO.** *Established 1857*
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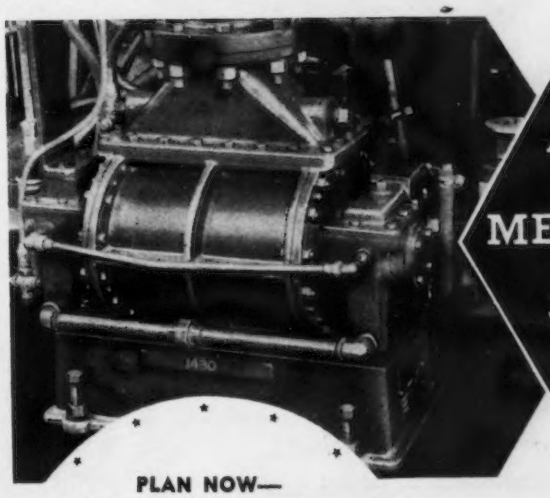


ACCURATE FLOW MEASUREMENT *for* 3,000 C.F.H. *and up*

PLAN NOW— TO SAVE TIME, LATER

Even though war restrictions may defer procurement of new meter equipment, we will be glad to help you work out the details of your needs now—for future action. Write for bulletin.

Photo shows an "R-C" Rotary Displacement Meter, measuring gas in an Eastern manufacturing plant. Roots-Connersville Meters are the logical choice for industrial gas users. They occupy small space in proportion to their capacity; and their rugged, all-metal construction, combined with absence of small wearing parts, assures low pressure absorption and accuracy for a life-period far beyond that of more complicated types.

ROOTS-CONNERSVILLE BLOWER CORP.
307 OHIO AVENUE, CONNERSVILLE, INDIANA

Roots CONNERSVILLE SINCE 1854

GAS METERS
FOR LOW, MEDIUM OR HIGH PRESSURES

Inspection

IS NOW THE PROBLEM!

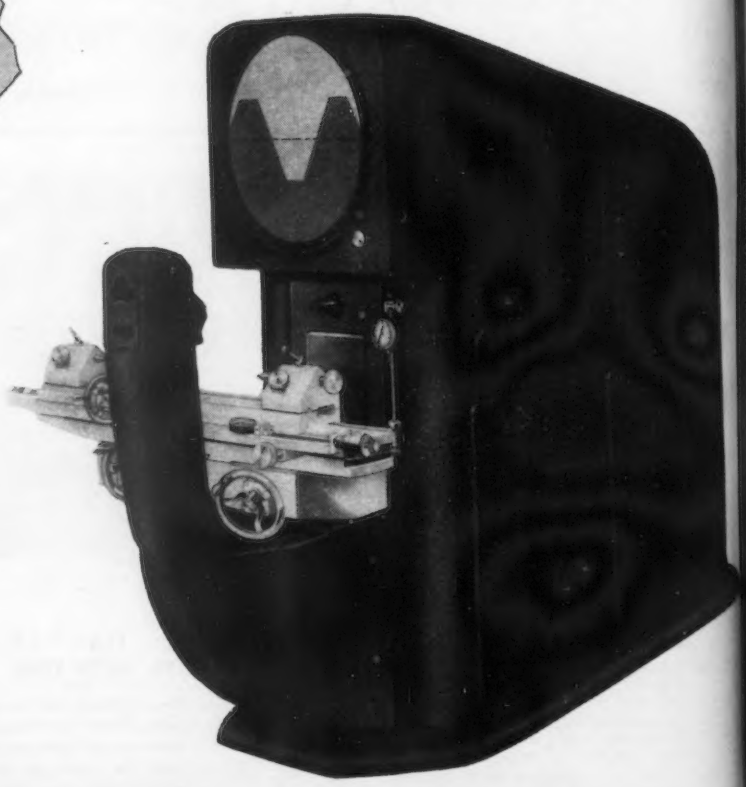
Production of armament and armament parts has been undergoing some rather interesting changes—that is to say, the production procedures and techniques. One has been the growing demand for use in production departments for what up until the middle of 1942 was gage laboratory equipment. For example, visual comparators such as those built by Jones & Lamson, Bausch & Lomb, and Portman Machine Co., are being used daily in inspecting production run parts. This type of equipment, it will be recalled, projects on a screen for visual comparison the shadow of the finished part, superimposed on a magnified outline of a perfect part, with or without tolerance bands.

Iron Age—
4/29/43

A year ago the problem confronting manufacturers was the setting up of production facilities. Most of this is now actually in use producing war parts of all kinds.

The important problem today is to improve inspection so as to facilitate the flow of machined parts within the specified tolerances.

Optical projection is the answer to a great many inspection problems, and we suggest that a solution may be obtained by contacting the three leading makers of this type of equipment.



We feel reasonably certain that either Bausch & Lomb, Jones & Lamson or Portman will be able to render some worthwhile assistance on particularly tough problems. So far as we, ourselves, are concerned, there is no obligation involved, and we will do everything to help you.

Incidentally, the Model P-3 Universal Optical Comparator, illustrated, is doing an excellent job along this line right now. GOOD DELIVERIES.

PORTMAN MACHINE TOOL COMPANY
70 MILL ROAD • NEW ROCHELLE, N. Y.
Telephone — New Rochelle 2-6700

Members: National Machine Tool Builders Association
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